



THE UNIVERSITY *of* EDINBURGH

This thesis has been submitted in fulfilment of the requirements for a postgraduate degree (e.g. PhD, MPhil, DClinPsychol) at the University of Edinburgh. Please note the following terms and conditions of use:

This work is protected by copyright and other intellectual property rights, which are retained by the thesis author, unless otherwise stated.

A copy can be downloaded for personal non-commercial research or study, without prior permission or charge.

This thesis cannot be reproduced or quoted extensively from without first obtaining permission in writing from the author.

The content must not be changed in any way or sold commercially in any format or medium without the formal permission of the author.

When referring to this work, full bibliographic details including the author, title, awarding institution and date of the thesis must be given.



THE UNIVERSITY *of* EDINBURGH

**An examination of the contribution of mindfulness and
catastrophising to the presence of anxiety and frequency of COPD
related hospital admissions in COPD patients.**

Gráinne O' Brien

Doctorate in Clinical Psychology

The University of Edinburgh

May 2014

Contents

| | |
|--------------------------------------------------|----|
| D. Clin. Psychol. Declaration of own work | 3 |
| Acknowledgements | 5 |
| List of Tables and Figures | 6 |
| Overview of Thesis | 7 |
| Thesis Abstract | 8 |
| Chapter 1: Systematic Review | 9 |
| <i>Abstract</i> | 10 |
| <i>Introduction</i> | 11 |
| <i>Method</i> | 14 |
| <i>Results</i> | 17 |
| <i>Discussion</i> | 31 |
| <i>References</i> | 35 |
| Chapter 2: Journal Article | 42 |
| <i>Abstract</i> | 43 |
| <i>Introduction</i> | 44 |
| <i>Methodology</i> | 50 |
| <i>Results</i> | 58 |
| <i>Discussion</i> | 67 |
| <i>References</i> | 71 |
| Chapter 3: Extra Methodology | 80 |
| Chapter 4: References | 83 |
| Appendices | 96 |

Word Count: 25,419

D. Clin. Psychol. Declaration of own work

This sheet must be filled in (each box ticked to show that the condition has been met), signed and dated, and included with all assignments - work will not be marked unless this is done

Name: Gráinne O' Brien

Assessed work: Thesis

Title of work: An examination of the contribution of mindfulness and catastrophising to the presence of anxiety and frequency of COPD related hospital admissions in COPD patients.

I confirm that all this work is my own except where indicated, and that I have:

- Read and understood the Plagiarism Rules and Regulations ✓
- Composed and undertaken the work myself ✓
- Clearly referenced/listed all sources as appropriate ✓
- Referenced and put in inverted commas any quoted text of more than three words (from books, web, etc) ✓
- Given the sources of all pictures, data etc. that are not my own ✓
- Not made undue use of essay(s) of any other student(s) either past or present (or where used, this has been referenced appropriately) ✓
- Not sought or used the help of any external professional agencies for the work (or where used, this has been referenced appropriately) ✓
- Not submitted the work for any other degree or professional qualification except as specified ✓
- Acknowledged in appropriate places any help that I have received from others (e.g. fellow students, technicians, statisticians, external sources) ✓
- Complied with other plagiarism criteria specified in the Programme Handbook ✓
- I understand that any false claim for this work will be penalised in accordance with the University regulations ✓
- (For R2 & Thesis) Received ethical approval from an approved external body and registered this application and confirmation of approval with the University of Edinburgh's School of Health's ethical committee ✓

Signature

Date12/05/2014

Please note:

a) If you need further guidance on plagiarism, you can:

i/ Speak to your personal tutor or supervisor

ii/ View university regulations at <http://www.ed.ac.uk/schools-departments/academic-services/policies-regulations>

b) Referencing for most assessed work should be in the format of the BPS style guide, which is freely available from the BPS web site

Acknowledgements

First and foremost I would like to thank the participants who completed the questionnaires. It was very much appreciated. I would like to thank Dr Paul Graham Morris for all his support and patience throughout this research journey.

I am very lucky to be surrounded by wonderfully supportive people in both my personal and professional life. I would like to say a big thank you to Dr Caroline Cochrane who has been an inspiration and a guiding light both personally and professionally over the past few years. Thank you for all your support. I have been very lucky in my training route and met some fantastic supervisors who have inspired and challenged me – thank you.

Clinical psychology training can be very challenging at times and I have been very grateful for the support of my fellow trainees particularly Ann-Marie Purcell and Shona Brown, who have become like family to me. Friends, new and old, have helped me to try to have a work-life balance – thank you!

Thank you to my fantastic family who have always helped me to believe I could achieve anything I wanted to and for all their support along this journey. Thank you Mum, Dad and Granda for inspiring my curiosity about the world and my interest in people and their stories and thank you to my Nanny for her love of learning, which inspired me from an early age.

List of Tables and Figures

List of Tables

Table 1.1: Characteristics and key findings of reviewed studies

Table 1.2: Quality ratings of included studies

Table 2.1: Demographic characteristics of the sample

Table 2.2: Descriptive Statistics for Key Variables

Table 2.3: Correlational Analyses for Key Variables

Table 2.4: Hierarchical regression for predicting hospitalisations

Table 2.5: Hierarchical regression for predicting anxiety

List of Figures

Figure I: Systematic review process

Overview of Thesis

This thesis follows the portfolio format and the following information provides a brief summary of the main chapters of the thesis:

Chapter 1 is a systematic review of the research literature regarding the impact of anxiety upon hospital admissions in people with Chronic Obstructive Pulmonary Disease. Chapter 2 presents a research journal article which explores the role of catastrophising and mindfulness in reported anxiety and hospital admissions in people with Chronic Obstructive Pulmonary Disease. Both articles are written for publication in the British Journal of Health Psychology (see Appendix A for Author Guidelines). Chapter Three is comprised of additional information about the methodology of the research study. The thesis portfolio concludes with a complete reference list for the whole thesis and an appendix section, which allows the reader to access extra information related to the research process.

Thesis Abstract

Purpose: The aim of the systematic review was to explore the role that anxiety plays in hospital admissions for those with Chronic Obstructive Pulmonary Disease (COPD). The empirical study aimed to examine whether the frequency of COPD related admissions is related to psychological factors (anxiety, depression, catastrophising, and mindfulness), disease severity, perceived disability and demographic factors. It also sought to examine whether cognitive factors (mindfulness and catastrophising) may explain unique variance in predicting anxiety and COPD-related admissions when other relevant factors are controlled for.

Methods: The literature was systematically searched for research related to the predictive power of anxiety in relation to COPD related hospital admissions. A postal cross-sectional survey of 54 people with COPD examined the psychological profile of those who are admitted to hospital for COPD, and if mindfulness and catastrophising can predict anxiety and COPD hospital admissions. Correlations and multiple regressions were utilised to explore these hypotheses.

Results: Fourteen studies met inclusion criteria for the systematic review, demonstrating mixed results regarding whether anxiety plays a role in COPD related hospital admissions. Findings from the empirical study suggest that a significant relationship exists between disease severity and number of COPD hospital admissions and catastrophising and overall mindfulness predicted 16.3% of variance in COPD hospital admissions (non-significant). Anxiety scores were significantly correlated with breathlessness, depression, catastrophising and mindfulness with catastrophising and mindfulness predicting 22.3% of variance in anxiety (significant).

Conclusions: Further research with robust measures of anxiety and hospital utilization are needed to aid our understanding of the role of anxiety in COPD related admissions. Further research is necessary to determine if mindfulness and catastrophising are useful constructs in predicting anxiety levels and hospital admissions in those with COPD. This will help to inform future psychological interventions with this population.

Chapter 1: Systematic Review

Does anxiety impact upon COPD hospital admissions? A Systematic Review

Gráinne O' Brien MSc ab *, Dr. Paul Graham Morris PhDa,

a.Department of Clinical Psychology, The University of Edinburgh, b.Department of Clinical Psychology, Astley Ainslie Hospital, Edinburgh, NHS Lothian.

*Corresponding author

Corresponding author:

Gráinne O' Brien, Department of Clinical Psychology, Astley Ainslie Hospital, Edinburgh, EH9 2HL. Tel: 0131 537 9128

E-mail: grainne.obrien@nhslothian.scot.nhs.uk

Word count: 6,170 (not including references)

Written in accordance with the instructions for authors for the British Journal of Health Psychology (see Appendix A for author guidelines).

Abstract

Purpose: Chronic Obstructive Pulmonary Disease (COPD) is a significant worldwide health problem with previous research indicated that anxiety and/or depression exacerbate the symptoms. Therefore the aim of this systematic review was to explore the role that anxiety plays in hospital admissions for those with COPD.

Methods: The literature was systematically searched for research related to the predictive power of anxiety in relation to COPD related hospital admissions. The quality of all papers meeting inclusion criteria for the review was assessed.

Results: Fourteen studies met inclusion criteria for the systematic review, demonstrating mixed results regarding whether anxiety plays a role in COPD related hospital admissions. Approximately one third of the studies reported evidence that anxiety has an impact upon COPD hospital admissions and the majority of these were deemed methodologically strongest in this review. However, overall comparison of findings in the reviewed studies were mixed, indicating that this may be accounted for by the heterogeneity of the key study variables such as sample, design, anxiety outcome measures and categorisation of hospitalisation.

Conclusions: Further research with robust measures of anxiety and hospital utilization are needed to aid our understanding of the role of anxiety in COPD related admissions.

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a progressive respiratory illness without a cure. It affects 80 million people worldwide (World Health Organisation, 2010) and is characterised by disabling physical symptoms such as breathlessness, chronic cough and sputum production. Living with COPD is related to reduced physical functioning (Eisner et al, 2010), reduced quality of life (Punekar, Rodriguez-Roisin, Sculpher, Jones, & Spencer, 2007) and increased mortality (Connors et al, 1996). COPD accounts for approximately 12.5% of all hospital admissions in Britain (NICE, 2004) with COPD being the third most common reason for an acute hospital admission in Scotland (NHS QIS, 2010). Most hospital admissions occur following an acute exacerbation which is “a sustained worsening of the patient’s symptoms from his usual stable state which is beyond normal day-to-day variations, and is acute in onset” (NICE, 2010, p37). A previous systematic review and meta-analysis demonstrated that patients with COPD who were experiencing anxiety and/or depression were at a greater risk for COPD exacerbations compared to those without anxiety and/or depression (Laurin, Moullec, Bacon, & Lavoie 2012).

Hospitalisations account for 70% of the treatment costs in COPD (Sullivan, Ramsey, & Lee, 2000). Rehospitalisation is common and occurs in up to 30% of patients within three months (Price et al 2006), and 60% of patients within 1 year post-discharge (Garcia-Aymerich et al, 2003; Gudmundsson et al, 2005). The direct healthcare costs of COPD to the NHS is estimated at £800 million per annum (Chief Medical Officer, 2004). A minority group of 10% of COPD cases are responsible for over 70% of expenditure through high healthcare use (Sullivan et al, 2000). It is clear that the economic burden of COPD is large, thereby generating interest in understanding the factors which may help us to predict COPD exacerbations, particularly those resulting in hospitalisation.

Although COPD-related hospitalisations are more frequent in those with more severe disease (Wedzicha & Hurst, 2007; Miravittles et al, 2000), it is also true that there are those with more severe COPD who do not attend hospital frequently (Soler et al, 2004). Other risk factors for hospital admissions include self-reported health status and perceived daily activity levels (Garcia-Aymerich et al, 2006), co-morbidity (Miravittles et al, 2000), depression (Coventry, Gemmell & Todd, 2011), anxiety (Benzo et al, 2010), increased age (Gadoury et al, 2005), previous admission (Almagro et al, 2006) and use of long-term oxygen therapy (Garcia-Aymerich et al, 2003). Anxiety is a particularly interesting risk factor to clinicians as it is a common experience for those with COPD, with prevalence of clinical anxiety ranging from 10-55%, generalized anxiety disorder 6-33% and panic disorder 0-41% (Willgoss & Yohannes, 2013).

People with COPD are twice as likely to experience anxiety compared to matched controls (Eisner et al, 2010). The causal pathway between COPD and anxiety is complex in nature and bi-directional. Increased COPD symptoms of breathlessness, limited activity and repeated exacerbations are likely to increase anxiety in patients with COPD, while research has also demonstrated that increased anxiety can result in increased breathlessness (Bailey et al, 2004; Gudmundsson et al, 2005). Physiological theories hypothesise that the emotional experience of dyspnoea (breathlessness) is processed in the same areas of the brain that processes fear and anxiety, the insula and anterior cingulate cortex (Evans et al, 2002; von Leupoldt et al, 2009). Cognitive models such as Clark's theory of panic (Clark, 1986) suggest that panic and anxiety in COPD could result from the catastrophic misinterpretation of dyspnea (Sutton, Cooper, Pimm, & Wallace, 1999) as something dangerous, resulting in an increase in anxiety.

Anxiety in those with COPD has been suggested as a risk factor for hospital admission (Benzo et al, 2010), readmission (Gudmundsson et al, 2005), increased exacerbations and longer hospital stays (Xu et al, 2008). However other studies have

failed to find a significant relationship between anxiety and COPD-related admissions (Cao , Ong, Eng, Tan, & Ng, 2006; Kim et al, 2000). It is clear that research related to the predictive power of anxiety for COPD hospital admissions is currently contradictory in nature and the impact of anxiety upon COPD-related hospital admission remains unclear. Anxiety is a modifiable risk factor and thus is of great interest to researchers and clinicians.

Two systematic reviews (Laurin et al, 2011; Laurin et al, 2012) have previously explored the impact of psychological distress (anxiety and depression) on COPD exacerbation rates, treated in both the hospital and the community. In these reviews, less than half of the selected studies demonstrated an association between levels of anxiety and/or depression and an increased risk of worsening symptoms, with the majority of these positive associations demonstrated in those treated in the community. These reviews were limited to studies published prior to April 2010 (Laurin et al, 2011) and April 2011 (Laurin et al, 2012) and included studies that had general measures of psychological distress alongside individual measures of anxiety and depression, and other respiratory conditions besides COPD. Furthermore these reviews did not report applying an objective measure of methodological quality to enable the reader to understand the relative quality of the studies included.

In this review the focus is on exploring anxiety in isolation, as research has demonstrated its prevalence in those with COPD (Eisner et al, 2010) and is solely interested in those who access hospital services, as this population are costly to the NHS (Sullivan et al, 2000). The review thus aims to explore whether anxiety leads to an increase in COPD-related hospital admissions. This study aims to update the literature from previous systematic reviews (Laurin et al, 2012, Laurin et al, 2009) and specifically explore the impact of anxiety upon hospital admissions in people with COPD. Strict inclusion/exclusion criteria will be utilised to ensure the review answers the specific review question.

Method

Search strategy

A literature search using the following databases was carried out in July 2013 with no early date restrictions: ASSIA, CINAHL, EMBASE, MEDLINE Psychinfo, and Web of Science. The search terminology used was: (COPD OR chronic obstructive pulmonary disease OR emphysema OR bronchitis OR pulmonary disease) AND (mental disorder OR anxiety* OR stress OR distress OR health anxiet* OR panic) AND (hospital OR healthcare utilization OR admission* OR readmission* OR rehospitalisation* OR emergency OR exacerbation). The search was limited to articles available in the English language.

Inclusion criteria

Articles clearly specifying that the population under study were those with COPD. If COPD was one of a number of illnesses under study, the data related to those with COPD needed to be accessible. Anxiety as a risk factor for COPD-related hospitalisation and its' relationship to those hospitalisations needed to be measured.

Exclusion criteria

Articles which did not clearly assess anxiety, its' relationship to hospitalisation, or studies that focused on populations other than those with COPD.

Search results

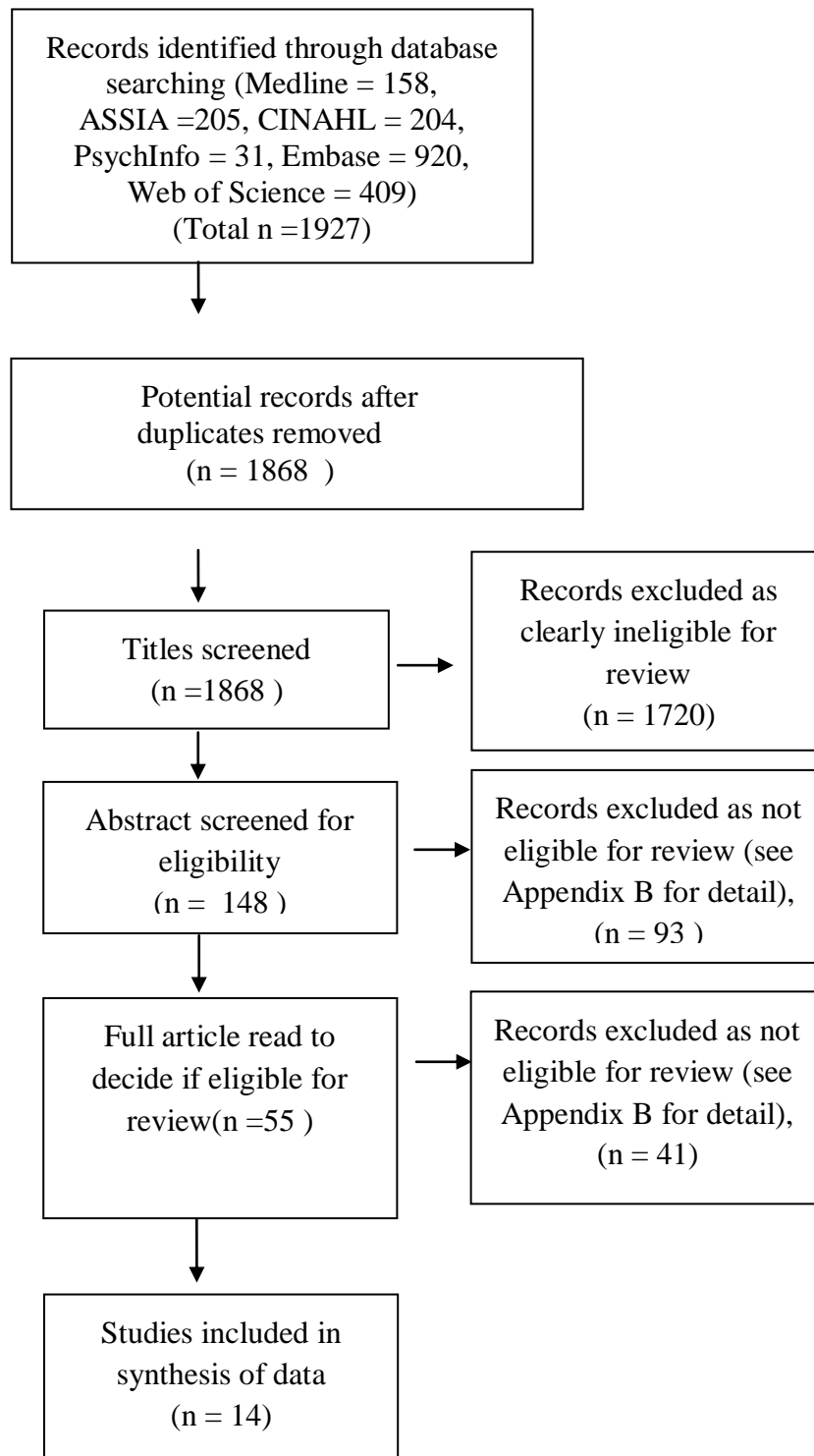
The search strategy initially identified a total 1927 publications (205 from ASSIA, 204 from CINAHL, 920 from EMBASE, 158 from MEDLINE, 31 from PsychInfo and 409 from Web of Science). This was reduced to 1868 after removing duplicates. A search of the Cochrane library of systematic reviews using the search terms detailed above revealed that no similar systematic reviews had been published under

these terms. The first step of screening the titles of these publications resulted in the identification of 148 articles. The second step of manually reviewing the abstracts of these papers resulted in 55 articles. In the case of uncertainty over the inclusion of a paper, the full article was read. Reference lists of all studies that met the inclusion criteria were read to check for any additional studies which could be relevant for inclusion. The full papers were read and 41 did not meet the review's criteria (see Appendix B for detail). This left 14 papers that were systematically reviewed. Figure 1 outlines the systematic review process utilised to identify studies included in the review.

Critical appraisal

The quality of all papers meeting inclusion criteria was assessed. A rating checklist was devised by the lead author in consultation with the second author to rate the methodological quality of the included studies (see Appendix C). This was based on the methodology checklists outlined in the Scottish Intercollegiate Guidelines Network (SIGN) 50 Guideline Developer's Handbook (SIGN, 2008) and the STROBE guidelines (van Elm et al, 2008), which were developed for the reporting of observational research. Gough and colleagues (2012) recommend that existing tools are adapted or new tools created to measure specific review questions.

Figure 1: Systematic Review Process



Results

Characteristics of Included Studies

Table 1.1 provides an overview of each article, presented alphabetically. All the studies included are observational in nature, with five cross-sectional in design (Abrams et al, 2011; Alcázar et al, 2012; Cao et al, 2006; Kim et al, 2000; Yohannes et al, 2000) , eight cohort in design (Benzo et al, 2010; Coventry et al, 2011; Eisner et al, 2010; Fan et al, 2007; Ghanei et al, 2007; Gudmundsson et al, 2005; Laurin et al, 2009; Xu et al, 2008) and one case-control study (Soler et al, 2004). The included studies were almost equally split between those which were retrospective (n=6) and prospective in design (n=8), with the study period ranging from three months to two years in retrospective studies and one -two years in prospective studies. Participants were recruited from various settings including outpatients (8 studies; Alcázar et al, 2012; Benzo et al, 2010; Eisner et al, 2010; Fan et al, 2007; Kim et al, 2000; Laurin et al, 2009; Xu et al, 2008; Yohannes et al, 2000), hospitalised patients (5 studies; Cao et al, 2006; Coventry et al, 2011; Ghanei, Aslani, AzizAbadi-Farahani, Assari, & Saadat, 2007; Gudmundsson et al, 2005; Soler, Sánchez, Román, Martínez, & Perpiñá, 2004) and one from medical records (Abrams et al, 2011). Overall, the sample sizes ranged from n=43 to n=26, 591 and the percentage of women in the studies ranged from 0 - 75%.

Quality of Included Studies

Table 1.2 provides an overview of the quality ratings for each study in relation to the systematic review question of whether anxiety impacts upon COPD hospital admissions. According to the quality criteria, Eisner et al (2010), Gudmundsson et al (2005) and Xu et al (2008) were the strongest methodologically, closely followed by Fan et al (2007) and Laurin et al (2009) while Soler et al (2004) was the weakest methodologically with all other studies falling on a continuum between the two.

Table 1.1. Characteristics and key findings of reviewed studies

| <i>Study</i> | <i>Study Design</i> | <i>Mean age in years (SD)</i> | <i>No of participants</i> <i>Gender (%)</i> | <i>Measure disease severity FEV1 % (SD) or GOLD stages (n values)</i> | <i>Measure of hospitalisation</i> | <i>Measure of anxiety (cut-offs)</i> | <i>Key Findings</i> |
|-------------------------------------|-------------------------------------------------------------|-------------------------------|----------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Abrams et al (2011) (USA)</i> | Cross-sectional Retrospective (database over 2 year period) | 69 (11.1) | 26, 591 Veterans Male: 97% | Severity not reported | 30 day readmission data from <u>Source</u> Hospital database | Psychiatric diagnoses of anxiety and PTSD (based ICD-9) in medical notes 2 years prior to hospital admission | Anxiety: 6.7% of sample Anxiety was associated with an increased risk for readmission within 30 days (OR 1.22, CI 1.03-1.43). |
| <i>Alcázar et al (2012) (Spain)</i> | Cross-sectional Retrospective (1 year) | 67 (8.7) | 127 Male: 94% | FEV1 – 41.9 % (15.3) Severe (moderate -very severe) | Number hospitalisation, their duration and visits to ER <u>Categories:</u> 0 admission ≥ 1 admission <u>Source</u> Hospital records | HADS – A | Anxiety: 32.7% in hospitalised Vs 18.9% in non- hospitalised (p <0.05). No significant association between anxiety and hospitalisations (OR .996, CI .866 – 1.145) |

| | | | | | | | |
|--------------------------------------------|------------------------------------------------------------------------|--------------------------------|------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Benzo et al (2010) (USA)</i> | Cohort Prospective (National Emphysema Treatment Trial, NETT) (1 year) | 67 (5.9) | 597 Male: 25% | Hospitalised: FEV1 - 26.16% (6.3) Non-hospitalised FEV1- 27.03% (7.3) All Severe/ Very Severe | Hospitalisation in 12 months. <u>Categories:</u> 0 admission ≥ 1 admission <u>Source</u> Self-report-questionnaires at 1 & 2 mths initially and then every 2 mths in person or via telephone | Item in Quality of Well-Being Scale | Anxiety associated with hospitalisation (P<.001). Anxiety was a significant predictor of hospitalisation (OR 1.75; CI 1.13 – 2.70). |
| <i>Cao et al (2006) (Singapore)</i> | Cross-sectional Retrospective (1 year) | 62% ≤ 75yrs (Age range: 50-95) | 186 Male: 84% | Severe/Very Severe: 49% of sample Mild/Moderate: 35% of sample Unknown: 16% of sample | Hospital readmission in year <u>Categories</u> Frequent readmission ≥ 2 admissions Non-frequent admission < 2 <u>Source</u> Hospital database | HADS- A (anxiety present ≥8) | Anxiety symptoms present in 12.5% frequent readmission 8.5% non-frequent readmission No significant association between anxiety and hospital readmission. |
| <i>Coventry et al (2011) (UK)</i> | Cohort Prospective (1 year) | 65 (9.9) | 79 Male: 56% | 42 % (18.4) | Hospital readmission within year <u>Categories:</u> 0 admission ≥ 1 admission <u>Source</u> Hospital Records | HADS- A | Anxiety in sample: 58% Anxiety did not predict readmission to hospital. |

| | | | | | | | |
|------------------------------------------|------------------------------------|-----------|------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Eisner et al (2010) (USA)</i> | Cohort Prospective (2 years) | 57 (6.3) | 1202 COPD 302 without COPD Male: 43% | 62% (20) Mild: 38% Moderate: 32% Severe: 21% Very Severe: 9% | Hospitalisation and ED visits <u>Source</u> Hospital Records | HADS-A anxiety present ≥ 8 | Anxiety in COPD patients: 15% Anxiety associated greater risk hospitalisation than those without anxiety (HR 1.39; 95% CI 1.007-1.90) Impact of anxiety mediated by COPD severity |
| <i>Fan et al (2007) (USA)</i> | Cohort Prospective (1 year) (NETT) | 66 (5.9) | 603 Male: 64% | 27% (7.1) | Hospitalisation or ED visits. <u>Categories:</u> 0 admission ≥ 1 admission <u>Source</u> Medicare claims data – Health Records | STAI | No association between anxiety (state or trait) and hospitalisation or ED visits |
| <i>Ghanei et al (2007) (Iran)</i> | Cohort Prospective (1 year) | 58 (11.0) | 157 Male: 63% | 77 % (15) | Hospital readmission <u>Categories:</u> 0 admission ≥ 1 admission <u>Source</u> Hospital Records | HADS- A | Higher scores of anxiety in hospital readmission group (p = 0.013) However anxiety was not a significant predictor of COPD hospital readmission in multivariate analysis |

| | | | | | | | |
|-----------------------------------------------------------|----------------------------------------|-----------|-------------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Gudmundsson et al (2005) (Nordic Countries)</i> | Cohort Prospective (1 year) | 69 (10.5) | 406 Male: 49% | 38% (18.2) | Readmission Categories: 0 admission ≥ 1 admission <u>Source</u> Self-report - Telephone call 1 year post-discharge, confirmed by hospital records | HADS - A(≥to 8) | Anxiety: 41% No significant difference in anxiety scores between those who were readmitted and those who were not (p=.28). In those with a lower health status, higher anxiety was associated with an increased risk of rehospitalisation. |
| <i>Kim et al (2000) (USA)</i> | Cross-sectional Retrospective (1 year) | 69 (4.7) | 43 Veterans Male: 100% | Moderate level | Hospitalisations and ED <u>Source</u> Hospital Records | BAI (>15 indicate moderate-severe anxiety) | Moderate-severe Anxiety: 33% Anxiety not associated increased hospitalisations or ED use. |
| <i>Laurin et al (2009) (Canada)</i> | Cohort Prospective (2 years) | 66 (8.0) | 110 Male: 49% | 52% (13.5) | Hospitalisations and ED. <u>Source</u> Self-report - Monthly phone contact and report by team confirmed by hospital records | ADIS-IV Anxiety | Anxiety: 46% (26% specific phobia & 21% panic disorder with agoraphobia) No differences in number of hospitalisations or ED visits between those with and without anxiety disorder diagnoses (p=.24) |

| | | | | | | | |
|------------------------------------------|-------------------------------------|---------|--------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Soler et al (2004) (Spain)</i> | Case-control Retrospective (1 year) | 72 (8) | 64 Male 100% | COPD-HC: 33% (12.1) Control: 37% (9.9) | Hospitalisation Categories <u>COPD-HC:</u> ≥2 hospitalisations, ≥ 3 ED or 1 admission & 2 ED <u>Source</u> Hospital Records | STAI Anxiety disorder when STAI-T >38 | All scores for anxiety within normal range STAI-S 16 (10) STAI-T 22 (11) No significant difference in anxiety between high healthcare utilizers and low healthcare utilizers. Anxiety not a predictor of hospitalisation. |
| <i>Xu et al (2008) (China)</i> | Cohort Prospective (1 year) | 66 (11) | 491 Male: 69% | 47% (15.9) Moderate: 40% Severe 40% Very Severe: 20% | Hospitalisation & Length of hospitalisation Categories 0 admission 1 admission ≥ 2 admission <u>Source</u> Self-report - Monthly phone contact and report by team. Confirmed by hospital records. | HADS-A (≥ 8= anxiety present; 8-10 = possible case, ≥ 11 = probable case) | Anxiety : 9.6% Possible cases 4.5% Probable cases 5.1% No significant association between anxiety and hospitalisations (p=0.11) Anxiety associated increased length of hospitalisation (P<.05) Among patients with at least one hospitalisation, length of hospitalisation estimated to be 1.99 times longer (95% CI, 0.59-6.72) for those with probable anxiety (NS). |

| | | | | | | | |
|------------------------------------------|----------------------------------------------|------------|---------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Yohannes et al (2000) (UK)</i> | Cross-sectional Retrospective (1 year) | 73 (13) | 137 Male: 50% | Severity not reported | Hospitalisations <u>Categories:</u> 0 admission ≥ 1 admission <u>Source</u> Self-report - unstructured questionnaire to participants and relatives/carers and hospital records | GMS (≥ 3 = case/clinical anxiety) | Clinically Anxious: 18% Anxiety was a predicting factor for frequency of hospital admission for COPD ($p \leq 0.05$). It explained 4% of variance in admissions. |
|------------------------------------------|----------------------------------------------|------------|---------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

HADS-A = Hospital Anxiety and Depression Scale – Anxiety scale; STAI = Strait-Trait Anxiety Inventory; GMS=Geriatric Mental State Schedule; ER = Emergency room visits; COPD-HC= COPD patients with high consumption health resources; NS = not significant

Table 1.2. Quality ratings of included studies

| Methodological Quality Criteria | | | | | | | | | Total Score (16) |
|-------------------------------------------------------------|-------------------------------------------------|----------------------------------------|---------------------------------------------|-----------------------------|----------------------------------------------|-------------------------------------------------|--------------------------------------------|---------------------------------------------------------|---------------------|
| <i>Study</i> | <i>Sampling Method (Representativeness)</i> | <i>Sample (Representativeness)</i> | <i>Sample Size (Representativeness)</i> | <i>Power</i> | <i>Anxiety Measure (Outcome Measure)</i> | <i>Healthcare Measure (Outcome Measure)</i> | <i>Analysis (Statistical Analysis)</i> | <i>Confounding Variables (Statistical Analysis)</i> | |
| <i>Abrams et al (2011)</i> <i>(USA)</i> | Adequately addressed (1) | Poorly addressed (0) | Not applicable (0) | Well covered (2) | Poorly addressed (0) | Well covered (2) | Well covered (2) | Well covered (2) | 9 |
| <i>Alcázar et al (2012)</i> <i>(Spain)</i> | Well covered (2) | Adequately addressed (1) | Not addressed (0) | Poorly addressed (0) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Well covered (2) | 10 |
| <i>Benzo et al (2010)</i> <i>(USA)</i> | Adequately addressed (1) | Poorly addressed (2) | Well covered (2) | Adequately addressed (1) | Poorly addressed (0) | Adequately addressed (1) | Well covered (2) | Well covered (2) | 11 |
| <i>Cao et al (2006)</i> <i>(Singapore)</i> | Adequately addressed (1) | Adequately addressed (1) | Well covered (2) | Poorly addressed (0) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Well covered (2) | 11 |
| <i>Coventry et al (2011)</i> <i>(UK)</i> | Adequately addressed (1) | Adequately addressed (1) | Well covered (2) | Poorly addressed (0) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Well covered (2) | 11 |
| <i>Eisner et al (2010)</i> <i>(USA)</i> | Well covered (2) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Well covered (2) | 14 |

| | | | | | | | | | |
|-----------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------|------------------|----------------------|----|
| <i>Fan et al (2007) (USA)</i> | Adequately addressed (1) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Well covered (2) | 13 |
| <i>Ghanei et al (2007) (Iran)</i> | Well covered (2) | Adequately addressed (1) | Not addressed (0) | Poorly Addressed (0) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Well covered (2) | 10 |
| <i>Gudmundsson et al (2005) (Nordic Countries)</i> | Well covered (2) | Well covered (2) | Adequately addressed (1) | Well covered (2) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Well covered (2) | 14 |
| <i>Kim et al (2000) (USA)</i> | Adequately addressed (1) | Adequately addressed (1) | Well covered (2) | Poorly addressed (0) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Well covered (2) | 11 |
| <i>Laurin et al (2009) (Canada)</i> | Well covered (2) | Adequately addressed (1) | Well covered (2) | Adequately addressed (1) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Well covered (2) | 13 |
| <i>Soler et al (2004) (Spain)</i> | Not reported (0) | Poorly addressed (0) | Not addressed (0) | Poorly Addressed (0) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Well covered (2) | 7 |
| <i>Xu et al (2008) (China)</i> | Well covered (2) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Adequately addressed (1) | Well covered (2) | Well covered (2) | Well covered (2) | 14 |
| <i>Yohannes et al (2000) (UK)</i> | Adequately addressed (1) | Adequately addressed (1) | Not addressed (0) | Well covered (2) | Well covered (2) | Well covered (2) | Well covered (2) | Poorly addressed (0) | 10 |

Representativeness

The included studies were explored to investigate whether the sample was representative of a COPD population and thus findings could be generalised. Most reviewed studies (n=13) used convenience sampling and invited all consecutive patients who met the inclusion/exclusion criteria to participate in the research. Systematic sampling was used by Ghanei et al (2007) while no information about sampling method was provided by Soler et al (2004). Most studies (n=14) described a diagnosis of COPD as an inclusion criteria, while Benzo et al (2010) and Fan et al (2007) specified severe emphysema as the necessary diagnostic criteria, which is only one diagnosis which falls under the COPD umbrella. Two studies focused exclusively upon Veterans resulting in limited female participants (0-3%; Abrams et al, 2011; Kim et al, 2000). Some of the studies in this review focused on people with COPD who were receiving ongoing extra nursing support in the community (Coventry et al, 2011) or had completed self-management training through completion of a pulmonary rehabilitation Programme (Benzo et al, 2010, Fan et al, 2007). Abrams et al (2011)'s excluded those who did not receive any ongoing outpatient care. It may be that some people with COPD do not engage with outpatient care but rather only utilise inpatient care. Two studies further excluded those with previous psychiatric diagnoses (Cao et al, 2006; Yohannes et al, 2000) while Kim et al (2000) study excluded those younger than 60 years of age. It is likely that specific inclusion and exclusion criteria and focusing on specific cohorts of those with COPD is likely to impact upon the findings and the generalisability of their findings.

In most reviewed studies (n=13), the samples were self-selected and could refuse to participate or drop out of the study at any time. The remaining study (Abrams et al, 2011) was based on medical records and did not involve any patient contact. Eight of the reviewed studies reported some detail in relation to attrition and five studies did not give sufficient detail (Alcázar et al, 2012; Ghanei et al, 2007; Soler et al, 2004; Yohannes et al; 2000) to enable us to know how representative the sample were.

In relation to specific sample characteristics, only one study (Gudmundsson et al, 2005) reported a sample with gender, age and severity of COPD which is representative of those with COPD in the general population. This is not unusual given that convenience sampling was utilised in most included studies. Overall there were fewer women than men in the included studies. Seven studies reported less than 35% women in their sample (Abrams et al, 2011; Alcázar et al, 2012; Cao et al, 2006; Ghanei et al, 2007; Kim et al, 2000; Soler et al, 2004; Xu et al, 2008), and all other studies, excluding Benzo et al (2010) had a more proportionate divide between the sexes. Severity of COPD varied greatly between samples. The sample in Ghanei and colleagues' (2007) study had 'less severe' disease and only 'severe' and 'very severe' illness reported in three samples (Benzo et al, 2010; Fan et al, 2007; Soler et al, 2004). Meanwhile, Cao et al (2006)'s study was comprised of participants whose disease severity varied across a continuum (i.e. mild to very severe). COPD is common in older people with the majority of the included studies demonstrating a good age-range, including those over 65 years. However, research by Eisner et al (2010) limited their sample to those aged between 40 – 65 years.

Power and Statistical Analysis

All reviewed studies reported descriptive statistics, and utilised appropriate univariate and multivariate analyses to examine the role of anxiety in hospitalisation, in accordance with whether the data collected was continuous or categorical. The majority of studies (n=13) described demographic and clinical confounding factors which could have an impact upon hospitalisation and any necessary adjustments in statistical analysis. Due to the large amount of variation in possible covariates, it is impossible to directly compare the studies in relation to their covariates. The author utilised the G*power computer programme to calculate details about power analysis. Six studies had a sufficient sample to enable power of at least .8 (Abrams et al, 2011; Eisner et al, 2010; Fan et al, 2007; Gudmundsson et al, 2005; Xu et al, 2008; Yohannes et al, 2000), two studies to enable power of at least .7 (Benzo et al, 2010; Laurin et al, 2009) and six studies to enable power of less than .7 (Alcázar et al, 2012; Cao et al, 2006; Coventry et al, 2011; Ghanei et al, 2007; Kim et al, 2000;

Soler et al, 2004). Those with lower power generally had a smaller sample size and a larger number of predictor variables or confounding variables (e.g. Cao et al, 2006 had 19 predictor variables) managed in multivariate analysis. Underpowered studies are at an increased risk of a Type II error.

Outcome Measures

Increased use of hospitalisation was measured in a number of different ways in the included studies: thirty day hospital readmissions (Abrams et al, 2011), number of hospitalisations in designated time (Alcázar et al, 2012; Benzo et al, 2010; Cao et al, 2006; Coventry et al, 2011; Eisner et al, 2010; Fan et al, 2007; Ghanei et al, 2007; Gudmundsson et al, 2005; Kim et al, 2000; Laurin et al, 2009; Soler et al, 2004; Xu et al, 2008; Yohannes et al, 2000), emergency department visit in designated time (Alcázar et al; 2012, Eisner et al, 2010; Fan et al, 2007; Kim et al, 2000; Laurin et al, 2009; Soler et al, 2004), length of hospital stay (Alcázar et al, 2012; Xu et al, 2008). Hospitalisation was recorded from medical records alone in the majority of studies (n=9), through patient self-report questionnaires at set time-points throughout the follow-up period (Benzo et al, 2010), or both self-report methods alongside the use of hospital records (Gudmundsson et al, 2005; Laurin et al, 2009; Xu et al, 2008; Yohannes et al, 2000). Furthermore, studies varied in whether they viewed hospitalisation as a continuous variable (n=4) or if they chose cut off points to categorise hospital use. The reviewed studies further varied in how they classified hospitalisations with the majority (n= 7) distinguishing between no hospital admissions and at least one hospital admission whereas other studies classified people according to frequent hospital admissions (e.g. ≥ 2 admissions) and less frequent admissions (n=3).

Similarly, anxiety was measured in a number of different ways in the studies selected in this review. The majority of studies utilised self-report measures which act as screening tools for anxiety (n=10) and had good validity and reliability. Measures included Hospital Anxiety and Depression Scale-Anxiety subscale (HADS; n=7;

Zigmond, & Snaith, 1983), Strait-Trait Anxiety Inventory (STAI; n=2; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) and Beck Anxiety Inventory (BAI; n=1; Beck, Epstein, Brown, & Steer, 1988) while one study used a single item from the Quality of Well-Being Scale (Kaplan, Bush, & Berry, 1975). This study was the only study in the review to use a single item as a 'stand alone' anxiety measure. Although the overall measure's psychometric properties are well established (Kaplan, Anderson, & Ganiats, 1993), there is no known evidence validating the use of the single item. A further study used psychiatric diagnostic labels of anxiety from the medical notes (Abrams et al, 2011), but no information was given in relation to who assigned the diagnosis and thus we cannot be confident of it's' reliability. The remaining studies utilised standardised diagnostic interview schedules including the Anxiety Disorders Interview Schedule anxiety (ADIS-IV ; Brown, DiNardo, & Barlow, 1994) and the Geriatric Mental State Schedule (GMS; Copeland et al, 1976), which have demonstrated good validity and reliability in diagnosing psychiatric disorders.

Key findings in the context of methodological quality of studies

Approximately a third of the included studies (5/14) reported evidence that anxiety has an impact upon COPD hospital admissions (See Table 1.1). This included three of the methodologically strongest studies from this review. Yohannes et al (2000) in a retrospective study demonstrated that those who were clinically anxious had an increased number of hospital admissions in the past year. Gudmundsson et al (2005) in a prospective study demonstrated an association between anxiety and rehospitalisation in those with lower health status, while Eisner et al (2010) suggested that the negative impact of increased anxiety upon COPD hospital admissions was mediated by the severity of COPD in their study. Similar findings were reported by two further studies. Benzo et al (2010) demonstrated in their prospective study that anxiety was a significant predictor of hospitalisation and Abrams et al (2011) reported that anxiety was associated with an increased risk of readmission within thirty days (Abrams et al, 2011).

The studies that found evidence for the relationship between increased anxiety and hospitalization were heterogeneous and had many differences in study design, sample and outcome measures (See Table 1.1 for detail). However it is worth noting that the majority of those studies (n=4) which found evidence for a relationship between increased anxiety and hospitalisation were well powered at least .8 while one was powered at least .7 (Benzo et al, 2010).

The remaining two of the methodologically strongest studies from this review failed to find an association between anxiety and hospitalisation, despite both studies being well-powered (at least .8). Xu et al (2008) reported no significant relationship between anxiety and hospitalisation in their study. However they further reported that anxiety was associated with an increased length of hospital admission. It is worth noting that within this sample, there appeared to be lower levels of baseline anxiety (9.6%) when compared to some of the other studies within the review (e.g. 15% Eisner et al, 2010; 41% Gudmundsson et al, 2005) . Furthermore Xu et al (2008) suggest that the loss of 8% of their sample at follow-up may have acted as a potential bias, as those who dropped out may have had higher levels of psychological distress. Fan et al (2007) failed to find any association between anxiety and hospitalisation. The sample which took part in this research had previously completed a pulmonary rehabilitation group, which is likely to have improved their self-management capabilities and may have impacted upon their hospital use. The relatively weakest methodological study further failed to find any evidence for anxiety impacting upon hospital use (Soler et al, 2004). This study along with the majority of all the remaining studies (n= 6) which failed to find an association were insufficiently powered, which is likely to increase the risk of a Type II error. Larger sample sizes may have allowed a greater exploration of the relationship between anxiety and hospitalisations.

Discussion

This systematic review aimed to summarise research findings exploring whether anxiety had an impact upon hospitalisations in COPD. Overall the review yielded mixed findings, with evidence that increased anxiety resulted in increased hospitalisation admissions in approximately a third of studies. The heterogeneous nature of the key variable in the included studies is an important factor in helping to understand the varying findings.

The representativeness of the samples (e.g. gender, sex, severity) studied within this review was variable, which impacts upon the generalizability of the findings of this review. Many of the studies had an unequal proportion of males to females. Although COPD has historically been more prevalent in men, recently prevalence seems to be becoming equal (Mannino & Buist, 2007) while hospitalisation rates have been approximately equal for men and women since 1995 (Mannino, Homa, Akinbami, Ford, & Redd, 2002). Furthermore, women are significantly more likely to have a clinical anxiety disorder (Willgoss & Yohannes, 2013). The fact that fewer women were included in some of the studies reviewed may have resulted in an underestimation of the role of anxiety in hospital admissions. Two studies within the review excluded those with a psychiatric history, which is likely to have impacted upon the strengths of the associations seen (Cao et al, 2006; Yohannes et al, 2000). A further factor to consider is the level of support and self-management training which participants' had access to and how this may impact upon hospital admissions and/or anxiety levels. Coventry & Hind (2007) demonstrated that pulmonary rehabilitation programmes can reduce anxiety symptoms in those with COPD. A recent systematic review (Zwerink et al, 2014) reported that self-management interventions within COPD resulted in a reduction of respiratory related hospital admissions. It is likely that these and other characteristics of the samples will have impacted upon the findings within this review.

The two main variables measured in the current review were hospitalisation and anxiety and it is clear from this review that there is wide variability in how this is measured currently in COPD research. Hospitalisation which was measured solely by self-report is likely to be susceptible to recall bias. The variability in how hospitalisation was categorised, such that some study's label '1' admission as 'frequent' while others label '2 or more' admissions as frequent, creates a difficulty when trying to compare and synthesise findings across studies. Although reliable and valid anxiety measures were used by the majority of the studies, only two studies utilised a structured psychiatric interview (Laurin et al, 2009; Yohannes et al, 2000). The majority of the other studies used self-report questionnaires which act as a screening measure for anxiety but do not provide a clinical diagnosis (Vogele & von Leupoldt, 2008). Self-report measures of anxiety are subjective and susceptible to bias. Furthermore the self-report measures used within the included studies have some weaknesses when used with the COPD population. The BAI has somatic anxiety symptoms which may overlap with symptoms of COPD (Kabacoff, 1997). Similarly, Martin (2005) suggests that the autonomic arousal component of the HADS may overlap with the somatic symptoms of COPD (Martin, 2005). A clinical interview such as the ADIS-IV may be a more robust method of assessing and diagnosing anxiety in clinical research with this population. The ADIS-IV is a more objective measure of anxiety as it is a semi-structured diagnostic measure created according to the DSM-IV criteria. It has demonstrated good clinician inter-rater reliability (Brown, Di Nardo, Lehman, & Campbell, 2001). This measure may too time-consuming for day-to-day clinical work, but is ideal for clinical research due to its structure and its reliability, allowing for a more valid comparison across participants and across studies.

These various weaknesses are likely to imply that the current studies, and this review may have underestimated the overall association between anxiety and hospitalisations in those with COPD.

Limitations of the review

The primary limitation of the current review is the heterogeneity between studies in relation to study sample, study design, anxiety outcome measures and categorisation of hospitalisation, which makes comparison across studies difficult. Due to this variability across included studies, it was decided not to pool data or conduct a meta-analysis, as the results would be misleading. The review was limited by time constraints and therefore study authors were not contacted for additional information and inter-rater reliability checks related to the ratings of the methodological quality for the studies were not utilised. This may have resulted in subjective bias in study ratings. Furthermore publication bias may have been introduced as this review excluded unpublished and non-English language papers. This is of particular concern in a systematic review of observational studies as there is a greater threat of publication bias than with randomised controlled trials (Easterbrook et al, 1991).

Study implications and future research

The results for this systematic review suggest that anxiety may be an important modifiable factor, which is associated with a higher risk of hospitalisation in those with COPD. Providing screening and targeted interventions for anxiety in this population could potentially prevent unnecessary hospital admissions and lead to monetary savings in the NHS. NICE (2010) recommend that those with COPD are screened for distress. Coventry & Hind (2007) reported a reduction in anxiety for those people with COPD who attended pulmonary rehabilitation. Baraniak & Sheffield (2011) in a systematic review and meta-analysis demonstrated that psychological interventions can have a positive impact upon anxiety in those with COPD. Research evaluating the direct impact of these interventions on COPD hospitalisations and on the economic implications are needed.

Due to the heterogeneous designs of the studies involved in this review, we were unable to establish a cause-effect relationship. Future well-powered prospective

studies with robust measures of hospitalisation and anxiety are needed to truly answer the review question.

Conclusion

The current review provides some strong evidence that anxiety may play an important role in hospitalisations in those with COPD, with approximately a third of the included studies demonstrating a positive relationship between anxiety and COPD hospitalisations. Those studies of higher quality within this review supported this association. Future studies with more robust measures of anxiety and hospital utilization would further aid our understanding of the role of anxiety in COPD related admissions.

References

- Abrams, T., Vaughan-Sarrazin, M. & Vander-Weg, M. (2011). Acute Exacerbations of Chronic Obstructive Pulmonary Disease and the Effect of Existing Psychiatric Comorbidity on Subsequent Mortality. *Psychosomatics*, 52, 441-449.
- Alcázar, B, García-Polo, C., Herrejón, A., Ruiz, L.A., de Miguel, J., Ros, J.A., Miravittles M. (2012). Factors associated with hospital admission for exacerbation of chronic obstructive pulmonary disease. *Archivos De Bronconeumologia*, 48 (3), 70-76.
- Almagro, P., Barreiro, B., Ochoa de Echaguen, A., Quintana, S., Rodriguez Carballeira, M., Heredia, J.L. & Garau, J. (2006). Risk factors for hospital readmission in patients with chronic obstructive pulmonary disease. *Respiration*, 73, 311-317.
- Bailey, P. (2004). The Dyspnea-Anxiety-Dyspnea Cycle—COPD Patients' Stories of Breathlessness: "It's Scary /When you Can't Breathe." *Qualitative Health Research*, 14(6), 760-778.
- Beck, A.T., Epstein, N., Brown, G., Steer, R.A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology*, 56, 893-897.
- Benzo, R., Chang, C.H., Farrell, M., Kaplan, R., Ries, A., Martinez, F.J..... Sciurba, F. (2010). Physical activity, health status, anxiety and risk of hospitalization in patients with severe chronic obstructive pulmonary disease. *Respiration*, 80, 10-18.
- Brown, T. A., DiNardo, P. A., & Barlow, D. H. (1994). *Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV)*. San Antonio, TX: Psychological Corporation.
- Brown, T. A., Di Nardo, P. A., Lehman, C. L., & Campbell, L. A. (2001). Reliability of *DSM-IV* anxiety and mood disorders: Implications for the classification of emotional disorders. *Journal of Abnormal Psychology*, 110, 49-58.

Cao, Z., Ong, K.C., Eng, P., Tan, W.C. & Ng, T.P. (2006). Frequent hospital readmissions for acute exacerbation of COPD and their associated factors. *Respirology* 11: 188-195.

Chief Medical Officer. (2004). Annual report of the chief medical officer on the state of public health. Department of Health Publications.

Clark, D.M. (1986). A cognitive approach to panic. *Behaviour Research Therapy*, 24(4), 461-470.

Connors, A.F., Dawson, N.V., Thomas, C., Harrell, F.E., Desbiens, D., Fulkerson, W.J..... Knaus, A. (1996). Outcomes following acute exacerbation of severe chronic obstructive lung disease. *American Journal of Respiratory and Critical Care Medicine*, 154(4), 959-67.

Copeland, J.R., Kelleher, M.J., Kellett, J.M., Gourlay, A.J., Gurland, B.J., Fleiss, J.L., & Sharpe, L. (1976). A semi-structured clinical interview for the assessment of diagnosis and mental state in the elderly: the geriatric mental state schedule. I. Development and reliability. *Psychological Medicine*, 6(3), 439–449.

Coventry, P., Bower, P., Keyworth, C., Kenning, C., Knopp, J, Garrett, C.....Dickens, C. (2013). The effect of complex interventions on depression and anxiety in COPD: Systematic Review and Meta-Analysis. *PLOS ONE*, 8 (4) e60532

Coventry, P.A., Gemmell, I. & Todd, C.J . (2011). Psychosocial risk factors for hospital readmission in COPD patients on early discharge services: a cohort study. *BMC Pulmonary Medicine*, 11: 49.

Coventry, P.A. & Hind, D. (2007). Comprehensive pulmonary rehabilitation for anxiety and depression in adults with chronic obstructive pulmonary disease: systematic review and meta-analysis. *Journal of Psychosomatic Research*, 63(5), 551-565.

Easterbrook, P.J., Berlin, J.A., Gopalan, R., & Matthews, D.R .(1991). Publication bias in clinical research. *Lancet*, 337, 867–872.

- Eisner, M.D. , Blanc, P.D. , Yelin, E.H. , Katz, P., Sanchez, G., Iribarren, C. & Omachi, T. (2010). The influence of anxiety on health outcomes in COPD. *Thorax*, 65(3), 229 – 234.
- Evans, K.C., Banzett, R.B., Adams, L., McKay, L., Frackowiak, & R.S., Corfield, D.R. (2002). BOLD fMRI identifies limbic, paralimbic, and cerebellar activation during air hunger. *Journal of Neurophysiology* 88, 1500 – 1511.
- Fan, V.S. , Ramsey, S.D. , Giardino, N.D., Make, B.J., Emery, C.F., Diaz, P.T....., Martinez, F.J. (2007). Sex, Depression, and Risk of Hospitalization and Mortality in Chronic Obstructive Pulmonary Disease. *Archives of Internal Medicine*, 167(21), 2345-2353.
- Gadoury, M.A., Schwartzman, K., Rouleau, M., Maltais, F., Julien, M, Beaupré, A..... Bourbeau, J. (2005) Self-management reduces both short and long-term hospitalisation in COPD. *European Respiratory Journal*, 26(5), 853-7.
- Garcia-Aymerich, J., Farrera, E., Félez, M.A., Izquierdo, J., Marrades, R.M. & Antó, J.M. (2003). Risk factors of readmission to hospital for a COPD exacerbation: a prospective study. *Thorax*, 58(2), 100–105.
- Ghanei, M., Aslani, J., AzizAbadi-Farahani, M., Assari, S. & Saadat, S. H. (2007). Logistic regression model to predict chronic obstructive pulmonary disease exacerbation. *Archives of Medical Science*, 3 (4), 360-366.
- Gudmundsson, G., Gislason, T., Janson, C., Lindberg, E., Hallin, R., Ulrik,Bakke, P. (2005). Risk factors for rehospitalisation in COPD: role of health status, anxiety and depression. *European Respiratory Journal*, 26, 414–19.
- Gudmundsson, G., Gislason, T., Janson, C., Lindberg, E., Suppli Ulrik, C., Brøndum, E., et al. (2006). Depression, anxiety and health status after hospitalisation for COPD: a multicentre study in the Nordic countries. *Respiratory Medicine*, 100(1), 87-93.
- Gough, D., Oliver, S. & Thomas, J. (2012). *An introduction to Systematic Reviews*. Croyden, UK: Sage Publications.

Kaplan, R.M., Anderson, J.P., & Ganiats, T.G. (1993). The Quality of Well-being Scale: rationale for a single quality of life index. In S.R. Walker & R.M. Rosser (eds) *Quality of life assessment: Key issues in the 1990s*. London: Kluwer Academic Publishers, 65-94.

Kaplan, R.M., Bush, J.W., & Berry, C.C. (1976). Health status: Types of validity for an Index of Well-being. *Health Services Research*, 478-507.

Kim, H.F.S., Kunik, M.E., Molinari, V.A., Hillman, S.L., Lalani, S., Orengo, C.A.,.....Goodnight-White, S. (2000). Functional impairment in COPD patients: the impact of anxiety and depression. *Psychosomatics*, 41, 465-471.

Laurin, C., Labrecque, M., Dupuis, G., Bacon, S.L., Cartier, A. & Lavoie, K.L. (2009). Chronic obstructive pulmonary disease patients with psychiatric disorders are at greater risk of exacerbations . *Psychosomatic Medicine*, 71(6), 667 – 674.

Laurin, C., Moullec, G., Bacon, S.L. & Lavoie, K.L. (2012) Impact of anxiety and depression on chronic obstructive pulmonary disease exacerbation risk. *American Journal of Respiratory and Critical Care Medicine*, 185(9), 918 – 923.

Mannino, D.M. & Buist, A.S. (2007). Global burden of COPD: risk factors, prevalence, and future trends. *Lancet*, 370, 765–773.

Mannino, D.M., Homa, D.M., Akinbami, L.J., Ford, E.S., & Redd, S.C. (2002). Chronic obstructive pulmonary disease surveillance: United States, 1971–2000. *Morbidity and mortality weekly report. Surveillance summaries*, 51(6), 1-16.

Martin, C.R. (2005). What does the Hospital Anxiety and Depression Scale (HADS) really measure in liaison psychiatry settings? *Current Psychiatry Reviews*, 1, 69-73.

Maurer, J., Rebbapragada, V., Borson, S., Goldstein, R., Kunik, M.E., Yohannes, A.M., & Hanania, N.A. (2008). Anxiety and depression in COPD: current understanding, unanswered questions, and research needs. *Chest*, 134 (4), suppl 43S - 56S.

Miravittles, M., Guerrero, T., Mayordomo, C., Sánchez-Agudo, L., Nicolau, F. & Segú J.L. (2000). Factors associated with increased risk of exacerbation and hospital

admission in a cohort of ambulatory COPD patients: a multiple logistic regression analysis. *Respiration*, 67, 495–501.

National Institute for Clinical Excellence (NICE). (2010). Chronic obstructive pulmonary disease: Management of chronic obstructive pulmonary disease in adults in primary and secondary care (Partial Update). <http://publications.nice.org.uk/chronic-obstructive-pulmonary-disease-cg101>. Accessed March 12, 2013.

National Institute for Clinical Excellence (NICE). (2004). Chronic obstructive pulmonary disease: national clinical guideline for management of chronic obstructive pulmonary disease in adults in primary and secondary care. *Thorax*, 59, 1-232.

NHS Quality Improvement Scotland (NHS QIS) (2010). Chronic Obstructive Pulmonary Disease Services Clinical Standards. http://www.healthcareimprovementscotland.org/our_work/long_term_conditions/copd_implementation/copd_clinical_standards.aspx. Accessed March 12, 2013.

Punekar, Y.S., Rodriguez-Roisin, R., Sculpher, M., Jones, P. & Spencer, M. (2007). Implications of chronic obstructive pulmonary disease (COPD) on patients' health status: a western view. *Respiratory Medicine*, 101(3), 661–9.

Price, I.C., Lowe, D., Hosker, H.S., Anstey, K., Pearson, M.G. & Roberts, C.M. (2006) UK National COPD Audit 2003; Impact of hospital resources and organisation of care on patient outcome following admission for acute COPD exacerbation. British Thoracic Society and the Royal College of Physicians Clinical Effectiveness Evaluation Unit, *Thorax*, 61, 837-842.

Scottish Intercollegiate Guidelines Network (SIGN). *SIGN 50 Guideline Developer's Handbook 2008*. <http://www.sign.ac.uk/guidelines/fulltext/50/section1.html>

Soler, J.J., Sánchez, L., Román, P., Martínez, M.A. & Perpiñá, M. (2004). Risk factors of emergency care and admissions in COPD patients with high consumption of health resources. *Respiratory Medicine*, 98 (4), 318–329.

- Spielberger, C.D., Gorsuch, R.L., Lushene, R., Vagg, P R., & Jacobs, G.A. (1983). *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Sullivan, P.F., Neale, M.C. & Kendler, K.S. (2000). Genetic epidemiology of major depression: Review and meta-analysis. *American Journal of Psychiatry*, 157, 1552–1562.
- Sutton, K., Cooper, M., Pimm, J. & Wallace, L. (1999). Anxiety in chronic obstructive pulmonary disease: the role of catastrophic thoughts. *Cognitive Therapy and Research*, 23(6), 573-585.
- Van Elm, E., Altman, G., Egger, M., Pocock, S. J., Gotsche, P. C. & Vandenbrouke, J. P. (2008). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Journal of Clinical Epidemiology*, 61, 344-349.
- Vogele, C., & von Leupoldt, A. (2008). Mental disorders in chronic obstructive pulmonary disease (COPD). *Respiratory Medicine*, 102(5), 764-773.
- Von Leupoldt, A., Sommer, T., Kegat, S., Baumann, H.J., Klose, H., Dahme, B. & Buchel, C. (2009). Dyspnea and pain share emotion-related brain network. *Neuroimage*, 48(1), 200-206.
- Wedzicha, J.A. & Hurst, J.R. (2007). Chronic obstructive pulmonary disease exacerbation and risk of pulmonary embolism. *Thorax*, 62(2), 103-104.
- Willgoss, T.G. & Yohannes, A.M. (2013). Anxiety disorders in patients with COPD: a systematic review. *Respiratory Care*, 58(5), 858-866.
- Yohannes, A.M., Baldwin, R.C. & Connolly, M.J. (2000). Depression and anxiety in elderly outpatients with chronic obstructive pulmonary disease: prevalence, and validation of the BASDEC screening questionnaire. *International Journal of Geriatric Psychiatry*, 15, 1090–6.
- Zigmond, A. & Snaith, R. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica*, 67, 361–370.

Zwerink, M., Brusse-Keizer, M., van der Valk, P.D.L.P.M., Zielhuis, G.A., Monninkhof, E.M., van der Palen, J., Frith, P.A., & Effing, T. (2014). Self management for patients with chronic obstructive pulmonary disease (Review). *Cochrane Database of Systematic Reviews*, Issue 3. Art.

Chapter 2: Journal article

An examination of the contribution of mindfulness and catastrophising to the presence of anxiety and frequency of COPD related hospital admissions in COPD patients.

Gráinne O' Brien MSc ab *, Dr. Paul Graham Morris PhDa, Dr. Caroline Cochraneb,

aDepartment of Clinical Psychology, The University of Edinburgh, bDepartment of

Clinical Psychology, Astley Ainslie Hospital, Edinburgh, NHS Lothian.

*Corresponding author

Corresponding author:

Gráinne O' Brien, Department of Clinical Psychology, Astley Ainslie Hospital, Edinburgh, EH9 2HL. Tel: 0131 537 9128.

E-mail: grainne.obrien@nhslothian.scot.nhs.uk

Word Count: (6542 excluding references)

Abstract

Purpose: Research to date has indicated that COPD is possibly affected by anxiety, whereby anxiety serves as a possible risk factor for hospital readmission, exacerbations of symptoms and longer hospital stays. The present study therefore aimed to examine whether the frequency of COPD related admissions is related to psychological factors (anxiety, depression, catastrophising, and mindfulness), disease severity, perceived disability and demographic factors. It also sought to examine whether cognitive factors (mindfulness and catastrophising) may explain unique variance in predicting anxiety and COPD-related admissions when other relevant factors are controlled for.

Methods: A postal cross-sectional survey of 54 people with COPD examined the psychological profile of those who are admitted to hospital for COPD, and if mindfulness and catastrophising can predict anxiety and COPD hospital admissions. Correlations and multiple regressions were utilised to further explore these hypotheses.

Results: Findings from the empirical study suggest that a significant relationship exists between disease severity and number of COPD hospital admissions and catastrophising and overall mindfulness predicted 16.3% of variance in COPD hospital admissions (non-significant). Anxiety scores were significantly correlated with breathlessness, depression, catastrophising and mindfulness with catastrophising and mindfulness predicting 22.3% of variance in anxiety (significant). It is clear that mindfulness and catastrophising may be important constructs in predicting anxiety and hospitalisations in those with COPD.

Conclusions: Further research is necessary to determine if mindfulness and catastrophising are useful constructs in predicting anxiety levels and hospital admissions in those with COPD. This will help to inform future psychological interventions with this population.

Introduction

COPD is an umbrella term used to describe airflow obstruction due to chronic bronchitis, emphysema, or both. It is a serious long-term and progressive illness with no cure. COPD is currently the UK's fifth biggest killer disease (British Lung Foundation, 2007) but is expected to be the third by 2020 (Murray & Lopez, 1997). The total number of people with COPD in Scotland was estimated at nearly 100,000 in 2007 and is projected to increase by 33 per cent between 2007 and 2027 (Audit Scotland, 2007). COPD is classified according to a severity banding ranging from mild to very severe and key symptoms include cough, sputum production, fatigue and shortness of breath (dyspnoea). The benefits of medical interventions are limited and therefore what a person does to help manage their own condition (e.g. self-management strategies) is very important (Booker, 2005).

COPD is the third most common reason for an acute hospital admission in Scotland (NHS QIS, 2010). In 2009, 1552 COPD-related emergency hospital admissions were recorded in Lothian (Lothian Respiratory MCN, 2011). Most hospital admissions occur following an acute exacerbation which is 'a sustained worsening of the patient's symptoms from his usual stable state which is beyond normal day-to-day variations, and is acute in onset' (NICE, 2010, p37). Hospitalisations account for 70% of treatment costs (Sullivan et al, 2000), with the direct cost to the NHS in Scotland estimated at more than £98.5 million in 2004/05 (Audit Scotland, 2007). Understanding those factors which help predict hospital admission would allow intensive interventions to be targeted at the most appropriate people.

Although COPD-related hospitalisations are more frequent in those with severe disease (Wedzicha et al, 2007), self-reported health status and perceived daily activity levels are good predictors of hospitalisations regardless of disease severity (Benzo et al, 2010; Garcia-Aymerick et al, 2006). Other risk factor for hospital

admissions include increased age, being female (Alcázar et al, 2012; Xu et al, 2008, Coventry et al, 2011), smoking (Godtfredsen, Vestbo, Osler & Prescott, 2002), use of oxygen therapy (Xu et al, 2008), co-morbidities (Alcázar et al, 2012; Xu et al, 2008) and lower socio-economic status (Coventry et al, 2011). Living with a partner can act as a protective factor in relation to readmission (Crockett, Cranston, Moss, & Alpers, 2002; Alcazar et al, 2012).

Anxiety has been suggested as a possible risk factor for hospital readmission (Gudmundsson et al, 2005), increased exacerbations and longer hospital stays (Xu et al, 2008). However other studies have failed to find a significant relationship between anxiety and COPD-related admissions (Cao et al, 2006; Coventry et al, 2011; Kim et al, 2000; Ng et al, 2007). Research further suggests that depression in those with COPD is significantly associated with an increased risk of exacerbations (Fan et al, 2007) hospitalisations (Xu et al, 2008) and readmission (Coventry et al, 2011). However, other studies have failed to find a significant association between depression and COPD-related hospital readmission (Cao et al, 2006; Gudmundsson et al, 2005). It is worth noting that many of these studies have methodological weaknesses including small or limited sample sizes (Kim et al, 2000, Cao et al, 2006) or have included other patient groups alongside COPD patients (Dahlen & Jahsen, 2002). The impact of psychological distress upon COPD-related hospital admission remains unclear, with a recent systematic review (Laurin et al, 2011) suggesting mixed results.

People with COPD are two to three times more likely to experience mental health issues compared with the general population (Andaenaes & Kalfoss, 2004 ; Naylor et al, 2012) with anxiety and depression estimated at 8-80% and 6-74% respectively in COPD (Yolhannes et al, 2010). Demographic and clinical characteristics have shown an association with increased anxiety including age, gender, (Di Marco, Verga & Reggente, 2006; Eisner et al, 2010), smoking (Patton et al, 1996), depression (Kunik et al, 2005), COPD severity (Eisner et al, 2010) and increased breathlessness ((Di

Marco et al, 2006). Having comorbid anxiety and/or depression alongside COPD can impact negatively upon COPD prognosis and interfere with illness self-management through poor adherence to recommended treatment (Fan et al, 2008). A recent meta-analysis demonstrated that the presence of co-morbid depression or anxiety increased the risk of mortality in those with COPD (Atlantis, Fahey, Cochrane, & Smith , 2013).

Clark's cognitive model of panic aids our understanding of why people with COPD may experience panic and anxiety (Clark, 1986). COPD's key symptom of breathlessness can be understood as a dangerous threat and as imminently catastrophic (e.g. death, suffocation), resulting in increased arousal and a panic/anxiety reaction. It is easy to understand how those living with COPD may be particularly susceptible to panic and anxiety attacks as breathlessness is a central symptom of both COPD and panic (Heslop et al, 2009) and is experienced as the most disabling symptom by patients (Hill, Geist, Goldstein & Lacasse, 2008). Psychophysiological research hypothesises that the emotional experience of dyspnoea (breathlessness) is processed in the same areas of the brain that processes fear and anxiety (Evans et al, 2002; von Leupoldt et al, 2009). Research has further demonstrated that for people with COPD the hyperventilation which accompanies anxiety worsens shortness of breath by causing bronchoconstriction (narrowing of the airways in the lungs) and lung hyperinflation (expansion of the lungs) (Smoller & Otto, 1998).

There are a number of psychological factors that may impact upon a person's psychological distress when living with COPD. The current research will focus upon two such factors: 'catastrophising' and 'mindfulness' and their impact on anxiety and COPD-related hospitalisations.

Increased rates of catastrophic thoughts about COPD (e.g. beliefs about suffocating) have been shown to be related to increased anxiety (Livermore et al, 2008) and panic (Livermore et al, 2012), which is in line with Clark's model of panic. Catastrophising about COPD may result in an increased focus on COPD symptoms and misinterpreting them (Guerney-Smith et al, 2002, Sutton et al, 1999). The severity of catastrophic thoughts is a better predictor of anxiety than demographic or disease factors (Sutton et al, 1999), with an individual's ability to cope with COPD being more influenced by their interpretation of their symptoms rather than objective characteristics of their illness (e.g. severity banding) (Kaptein et al, 2008). Breathlessness can precipitate anxiety and vice versa with psychological outcomes linked to both the physical manifestation of the disease and a person's interpretation of that (Baraniak et al, 2011). Increased catastrophic misinterpretation of COPD and/or anxiety symptoms is likely to result in an increase in hospitalisation and the author is unaware of any previous research in this area.

Mindfulness has been theorised to be an important construct in psychological functioning generally and anxiety problems specifically (Zvolensky et al, 2006). One of the most widely cited definitions for mindfulness is that of Bishop et al (2004) who argue for two key components which are: the self-regulation of attention (awareness) to the current experience and a non-judgmental acceptance of the present moment. These two components have been supported by empirical research (Coffey, Hartman, & Fredrickson, 2010). Mindfulness can be conceptualized as a dispositional/trait variable and describes an individual's level of mindfulness in day to day life (Brown & Ryan, 2003). Low trait mindfulness is associated with depression (Brown & Ryan, 2003) and social anxiety (Brown & Ryan, 2003). High trait mindfulness is associated with greater life satisfaction, positive mood and sense of autonomy (Brown & Ryan, 2003). Baer and colleagues, (2008) suggest that the mindfulness facets of 'describing', 'awareness', 'non-reactivity' and 'non-judging' predict fewer symptoms while 'observe' predicts increased symptoms.

In relation to anxiety it is conceptualised that a person with higher trait mindfulness will develop a non-judgmental awareness of each moment, be able to observe a situation without getting caught up in it, and thus not catastrophise when experiencing unpleasant bodily sensations, (e.g. breathlessness, Erisman & Roemer, 2012; Hayes et al, 1996; Mental Health Foundation, 2010). Greater trait mindfulness is associated with lower distress and disability in people with chronic pain (McCracken et al, 2007) while low trait mindfulness is related to greater catastrophising in people with chronic pain (Schutze et al, 2010). Higher trait mindfulness has been associated with lower healthcare utilization (Brown & Ryan, 2003). In recent research (Consedine & Butler, 2013) with a healthy adult sample, greater 'observe' scores (noticing and attending to internal stimuli) were associated with increased healthcare use while those with greater 'non-react' scores (allow thoughts and feelings to come and go) described less healthcare use. However the sample in their study were young healthy adults which may not be representative of a more unwell sample. Furthermore, healthcare utilisation was collected by self-report questionnaire which may have led to a bias in information presented, particularly as they were asked to recall information for the past year. There has been limited mindfulness research in a COPD population with only one known study to date, which did not measure mindful skill achievement or anxiety and had a high drop out rate (40%) (Mularski et al, 2009). No research to date has studied mindfulness in relation to COPD-related hospital admissions.

The current study hopes to build upon previous psychological research in COPD and aims to add to the current literature in relation to the psychological profile of those who are admitted to hospital for COPD related issues. The two main aims are to (1) explore whether the frequency of COPD related admissions in a 12 month period is related to psychological factors (anxiety, depression, catastrophising, and mindfulness), disease severity, perceived disability and demographic factors, and (2) examine whether cognitive factors (mindfulness and catastrophising) may explain unique variance in predicting anxiety and COPD-related admissions when other relevant factors are controlled for.

Hypothesis1:

The number of COPD-related admissions to hospital over the past year will be negatively correlated with mindfulness, and positively correlated with psychological distress (anxiety & depression) catastrophising, disease severity and perceived disability (breathlessness).

Hypothesis 2:

Anxiety will be positively correlated with catastrophising, depression, disease severity and perceived disability (breathlessness), and negatively correlated with mindfulness.

Hypothesis 3:

Catastrophising and mindfulness will be significant predictors of anxiety and frequency of COPD admissions to hospital, when variance shared with confounding variables is controlled

Methodology

3.1 Design

The current study was a postal cross-sectional self-report questionnaire study.

3.2 Participants:

Potential participants included any person with Chronic Obstructive Pulmonary Disease (COPD) who were listed on the records of a Lothian based hospital (Western General Hospital, Royal Infirmary Hospital, St John's Hospital). They had to meet the following inclusion and exclusion criteria.

Inclusion:

- A diagnosis of COPD (GOLD criteria according to spirometry) as recorded on Trak records.
- Adult (18 years +).
- Male or Female.
- Fluent in written English as the questionnaires used in the current study are normed in the English language.

Exclusion:

- A diagnosis of a dementia recorded in the medical notes. This may have impacted upon the participants' understanding of the questions being asked in the questionnaire pack.
- Patients currently receiving palliative/end of life treatment. Completing the questionnaire pack could be viewed as an unfair burden for them. There are no set criteria on how COPD sufferers needing palliative care should be identified (White et al, 2011). However prognosis is known to be related to severe airflow obstruction ($< 30\%$ FEV1), frequent exacerbations, a requirement for long-term oxygen therapy, development of cor pulmonale and clinician's expectation of death within the next 12 months (Seamark et al, 2007). Judgment of when treatment becomes palliative is usually a matter of

experienced clinical judgment (Seamark et al, 2007) and thus the researcher sought the expertise and advice of Lothian specialist respiratory nurses to ensure these people were not invited to take part in the current study.

3.3 Procedure

Identifying participants

A list of potential participants was created from routine data collected centrally by NHS Lothian. This list was created by a data manager within Performance Review. The list initially contained a list of people who have had at least one COPD-related hospital admission in Lothian in the past three years. This time period (three years) was utilised to ensure people who had not been admitted in the past year (12 months) were also identified. A filter was then applied by the data manager to identify those people who had 0, 1, 2 or 3+ admissions in the past 12 months.

The information gathered included the contact details of each participant and number of COPD-related hospital admissions. No personal information about potential participants was given to the Chief Investigator. A member of staff from the Lothian Respiratory Team, who was already a part of the potential participants clinical care team, received the list of potential participants. Therefore no information was provided to the Chief Investigator prior to consent being obtained from the participants themselves. At this stage the list of names was examined by a Specialist Respiratory Nurse to ensure they met the criteria for inclusion in the current study (as detailed above). Only those potential participants who met the study criteria (as detailed above) were invited to take part in the research study.

The current study utilised stratified sampling to randomly sample across the four frequency groupings (3 or more, 2, 1 or 0 COPD-related hospital admissions in the

past year) to ensure the sample was as representative as possible. A randomising computer programme (www.randomizer.org) was utilised for this purpose.

Procedure:

NHS ethical approval for the research study was obtained from the South East Scotland Research Ethics Committee. Once potential participants were identified, an invitation letter, information sheet, consent form, questionnaire pack and stamped addressed envelope were sent to them by a member of the Respiratory team.

At this point permission was sought from the participants for the chief investigator to access their online trak records so that medical information such as severity of illness and co-morbid conditions could be accessed. Potential participants were encouraged to contact the researcher if they have any questions related to the study or if they required any additional support to complete the questionnaire pack (e.g. prefer to complete it over the telephone rather than complete a hard copy). If a participant took part in the research study a letter was sent to their GP to inform them of their participation. If the potential participant did not return the questionnaire pack within 4 weeks, a reminder letter with a copy of the invitation letter, questionnaire pack, information sheet, consent form and a stamped addressed envelope was sent, in case the initial copy had been misplaced. If they did not return the second questionnaire pack, the chief investigator assumed they did not wish to take part in the research study.

3.4 Measures

- Demographic information

Information such as gender, age, marital status, and occupational status, current living situation, co-existing medical conditions, and smoking status was gathered. Where possible this information was gathered from Trak records (with the

participants' permission) and the rest of the information was gathered through self-report from participants.

- Clinical Information (COPD severity banding)

This information was gathered from Trak records (with participants' permission). Lung function was measured by forced expiratory volume in 1 second (FEV1) by spirometry tests (breathing tests) carried out by trained professionals. Classification of severity and COPD stages (mild- very severe) according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines was recorded (See Appendix D) .

- COPD Healthcare Utilisation

The number of COPD related hospital admissions (0+ admissions) to Lothian based hospitals (Western General Hospital, Royal infirmary, St John's Hospital) over the past 12 month period was ascertained centrally by Performance Review from data collected centrally by NHS Lothian.

- MRC (Medical Research Council) Dyspnoea Scale (Fletcher, 1960)
(disability associated with COPD)

This scale is a measurement of the effect of breathlessness on daily activities. The MRC breathlessness scale does not quantify breathlessness itself. Rather, it quantifies the disability associated with breathlessness. The MRC dyspnoea scale asks a person to indicate the extent to which their breathlessness affects their mobility. The scale has five statements that describe almost the entire range of respiratory disability from none (e.g. 'I only get breathless with strenuous exertion' Grade 1) to almost complete incapacity (e.g. 'I am too breathless to leave the house' Grade 5). The score correlates well with the results of other breathlessness scales, lung function measurements (Mahler & Wells, 1988) and with direct measures of disability such as walking distance (American Thoracic Society, 1999). It was

utilised in the current study as it compliments the FEV₁ measurement (severity banding of the disease) in more fully describing disability in those with COPD (Bestall et al, 1999).

- Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) to measure anxiety and depression

The HADS consists of 14 items divided into 7 items in the anxiety subscale and 7 items in the depression subscale, without the confounding of somatic symptoms related to physical illness. The participant is asked to choose from 4 responses for each question (scored 0-3). Each subscale score can range from 0-21 and contains cut-off points to indicate whether someone is 'within the normal range', or in a 'mildly', 'moderately' or 'severely' disordered state or whether a person's score indicates 'normal' range (0-7), 'possible clinical disorder' (8-10) or 'probable clinical disorder' (11-21). It was developed for use in general medical outpatient clinics, and is used widely in clinical practice and in research (Herrmann, 1997). The HADS was found to perform well in assessing the symptom severity and caseness of both anxiety disorders and depression in somatic, psychiatric and primary care patients and in the general population (Bjelland, Dahl, Haug & Neckelmann, 2002). Internal consistency measured by cronbach's alpha was 0.93 for anxiety and .90 for depression (Moorey et al, 1991). It has further been reported to have good face validity (Zigmond & Snaith, 1983). The HADS has been used in previous research with people with COPD (Howard et al, 2010; Xu et al, 2008). Cronbach's alpha in the current study was .86 for anxiety subscale and .81 for the depression subscale.

.

- Interpretation of Breathing Problems Questionnaire short version (IBPQ –S) (Gurney-Smith et al, 2002) to measure catastrophic beliefs related to COPD

The IBPQ-S is a self-report questionnaire which was developed by adapting the Interpretation of Breathing Problems Questionnaire (Sutton et al., 1999), as a measure to assess catastrophic thinking related to the physiological symptoms of COPD (i.e. illness specific catastrophic thinking). It consists of eight scenarios

describing the experience of a symptom commonly associated with COPD, either in a safe or unsafe situation (e.g. being breathless on a bus). Each scenario is followed by three open-ended questions designed to elicit catastrophic cognitions. Research has indicated that IBPQ-S catastrophic cognitions were related to anxiety triggered by COPD symptoms. It has demonstrated good inter-rater reliability and internal consistency (.87) and good overall construct validity (Gurney-Smith et al, 2002). It has been used in previous research with COPD patients evaluating the efficacy of a pulmonary rehabilitation group (Livermore et al, 2010) and in a study which has investigated the factors that predict panic psychopathology in COPD (Livermore et al, 2012). Cronbach's alpha in the current study was .79.

- Five Facet Mindfulness Questionnaire Short Form (FFMQ- SF) (Bohlmeijer et al, 2011)

The FFMQ-SF is based on the original FFMQ which is a 39-item self-report measure that was developed by Baer and colleagues (2006) by integrating items from previous mindfulness measures (the MAAS, FMI, KIMS, CAMS and MQ) using a factor analytic approach and conducting an exploratory factor analysis (Baer et al, 2006). It has been normed on undergraduate and community samples. The five factors are observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience. The five factors displayed adequate to good internal consistency and modest between factor analysis (Baer et al, 2006). Further examination of the FFMQ was completed by Baer et al. (2008) and concluded that the five-factor model was satisfactorily reproduced with experienced meditators. In 2011, Bohlmeijer and colleagues published a shortened 24-item version of the FFMQ (FFMQ-SF). High correlations were demonstrated between the short form and the original FFMQ with the content validity and psychometric properties sufficiently preserved in the short form. The five-factor structure of the FFMQ-SF was further confirmed in a sample of fibromyalgia patients. Research has thus demonstrated that the FFMQ-SF is a reliable and valid measure for use in adults with clinically relevant symptoms of depression and anxiety. Cronbach's alpha in the current study was .71.

3.5 Statistical Analysis

Power Analysis

An a priori power calculation was undertaken to estimate the desired sample size for this cross-sectional study. The statistical significance criterion was set at .05 and the power level was set at .8. It was anticipated that a maximum of 6 (catastrophising, mindfulness, depression, disease severity, perceived disability, age) variables would be used in any one regression analysis. An anticipated effect size was estimated by looking at previous similar cross-sectional research such as Cassidy and colleagues (2012) who investigated the relationship between mindfulness, disability, and psychological distress in a chronic pain population. In the regression analysis, the smallest r^2 value (.15) equates to a medium effect size. The estimated sample size for the current study according to the GPower Programme utilising linear multiple regression is 98.

Previous research utilising postal questionnaire studies with COPD patients has demonstrated response rates of 75% (Sundha, Janson, Lisspersc, Ställbergc, & Montgomery, 2012, with primary and secondary care patient sample), 63% (Hyland, Jones, & Hanney 2006, with a primary care and post-pulmonary rehabilitation sample) and 52% (Hoth, Wamboldt, Bowler, Make, & Holm, 2011, post hospital-discharge sample). In light of the sample calculations and utilising the most conservative response rate estimates the current study aimed to recruit 188 people. However given that many of the COPD population are older and there is a high proportion of dementias within Scotland (2.5% in people aged 30 + years and 7.2% in people aged 60 + years; Dementia Scotland, 2013) the current study utilising the highest percentage of estimated dementias aimed to invite 195 potential participants.

Description of analysis

All research data was anonymised before being inputted into SPSS (version 19), which was used for all data analyses. Demographic and clinical characteristics were initially explored through descriptive statistics to characterize the sample.

Key Hypotheses

Pearson correlations and Spearman's correlations were utilised to investigate the relationships amongst 1) the number of COPD-related hospital admissions and 2) anxiety and psychological distress (anxiety & depression), catastrophising, total mindfulness, disease severity, perceived disability and demographic factors.

Multiple regressions were utilised to examine the predictive power of catastrophising and trait mindfulness in relation to anxiety and the frequency of COPD related hospital admissions when controlling for covariates e.g. patient demographics, illness severity, depression.

Results

Demographics

A total of 57 questionnaires were returned out of the 300 who were invited to participate in the research, with the study having a response rate of 19%. Of those who did not take part in the research, eight contacted the researcher to explain their reasons (; with one already involved in another study, one believed the questionnaire was too long and the remaining (n=6) did not give any reason). Of the returned questionnaires (n=57), 3 questionnaires were discounted as they were only partially completed. The final sample was 54 people, 63% of whom were female with ages ranging from 41 – 86 years. A high proportion (78%) of this sample reported 'probable' anxiety according to the HADS cut-off. The sample as a whole appeared to be physically quite unwell with the majority of the sample (74%) having severe or very severe COPD, a higher level of breathlessness and only 7% of the sample describing themselves as not having any other comorbidities. The average number of hospital admissions in the previous year was 2 admissions with a range of 0-11 admissions. When asked about their current treatment regime, 74% of the sample reported using ongoing COPD treatment including nebuliser (43%) or long-term Oxygen treatment at home (4%) while a minority (5%) stated they were not on any ongoing COPD treatment. Nearly half of the sample lived on their own (42%) whilst others lived with their partner (46%) or children (4%) and the others did not specify their living arrangements. The majority of the sample were retired (81%). (See Table 2.1 for an overview of the main demographics of the sample).

Table 2.1: Demographic Characteristics of the Sample

| Variable | Response Level | N | % | Mean (standard Deviation) |
|---------------------------------|--------------------------|----|-----|---------------------------------|
| Age | Years | 54 | | 68 (9.8) (Age range 41 – 86) |
| Gender | Female | 34 | 63 | |
| | Male | 20 | 37 | |
| Ethnicity | White | 54 | 100 | |
| Socio-Economic Status | High | 10 | 19 | |
| | Medium | 33 | 61 | |
| | Low | 11 | 20 | |
| Hospital Admissions | Zero admissions | 12 | 22 | 2 (2.3) (Range:0-11) |
| | One admission | 12 | 22 | |
| | Two admissions | 9 | 17 | |
| | Three or more admissions | 21 | 39 | |
| Illness Severity | Mild | 6 | 11 | |
| | Moderate | 8 | 15 | |
| | Severe | 37 | 68 | |
| | Very severe | 3 | 6 | |
| Breathlessness Scale | Grade 1 | 0 | 0 | |
| | Grade 2 | 4 | 7 | |
| | Grade 3 | 12 | 22 | |
| | Grade 4 | 15 | 28 | |
| | Grade 5 | 23 | 43 | |
| Number of Co-morbidities | Zero | 4 | 7 | |
| | One | 12 | 22 | |
| | Two | 16 | 30 | |
| | Three | 11 | 20 | |
| | Four | 5 | 9 | |
| | Five | 3 | 6 | |
| Smoking | Six | 3 | 6 | |
| | | | | |
| Smoking | Yes | 15 | 28 | |
| | No | 39 | 72 | |

Table: 2.2 Descriptive Statistics for Key Variables

| Variable | Mean (Standard Deviation) |
|--------------------------------------|--------------------------------------|
| Catastrophising- (IBPQ-S) | 12 (4.7) |
| FFMQ- Describe | 15 (3.9) |
| FFMQ- Non-React | 15 (4.8) |
| FFMQ- Non-Judge | 14 (4.9) |
| FFMQ- Observe | 14 (4.2) |
| FFMQ- Act Aware | 16 (4.6) |
| Total | 75 (11.5) |
| HADS-A | 11 (4.9) |
| HADS-D | 9 (4.3) |

IBPQ-S = Interpretation of Breathing Problems Questionnaire-Short Form, FFMQ-DE = Five Facet Mindfulness Questionnaire Describe, FFMQ-NR = Five Facet Mindfulness Questionnaire Non-react FFMQ-NJ= Five Facet Mindfulness Questionnaire Non-judge, FFMQ-OB= Five Facet Mindfulness Questionnaire Observe, FFMQ-AA= Five Facet Mindfulness Questionnaire Act aware, FFMQ-TOT= Five Facet Mindfulness Questionnaire Total, HADS-A = Hospital Anxiety & Depression Scale Anxiety, HADS-D= Hospital Anxiety & Depression Scale Depression

Data Screening and Missing Data

A Missing Data analysis indicated that data was missing at random and thus Expectation Maximisation was utilised to input missing data. Expectation Maximisation has been recommended as a reliable method for dealing with random missing data (Scholler, Bauman, & Card 2010). Data was checked for outliers and means, standard deviations and levels of skewness and kurtosis. All variables were found to be normally distributed except for the 'Observe' and 'Non-judgemental' subscales of the FFMQ Scale.

Statistical Analysis

Pearson correlations were utilised to explore the relationships between normally distributed variables while Spearman's correlations were used for non-normally distributed variables for Hypotheses 1 & 2 (See Table 2.3).

Hypothesis 1:

The number of COPD-related admissions to hospital over the past year will be negatively correlated with psychological distress (anxiety & depression), and mindfulness and positively correlated with catastrophising, disease severity and perceived disability (breathlessness).

A statistically significant positive relationship existed between the number of COPD-related hospital admissions and disease severity ($r=.322$, $p<.01$, $N=54$) and smoking ($r=.240$, $p<.05$, $N=54$). This indicated that a medium and small effect size were found for these hypothesis respectively, according to Cohen's (1988) categorisation of effect sizes. When the various facets of mindfulness were explored in relation hospitalisation, the non-reactivity facet of mindfulness was significantly positively correlated with number of hospital admissions ($r= .260$, $p\leq .05$, $N= 54$), demonstrating a small effect size (See Table 2.3).

Table 2.3 Correlational Analyses for Key Variables

| Variable | Hospital Admissions | Anxiety |
|------------------------------------|----------------------------|------------------------|
| Age | r = .023 p = .433 | r = -.299 p = .014* |
| Gender | r= .111 p= .424 | r=.164 p=.237 |
| Socio-Economic Status | r= .17 p=.452 | r=-.112 p=.211 |
| Hospital Admissions | | r =.218 p = .057 |
| Illness Severity | r=.322 p=.009*** | r= .153 p=.135 |
| Breathlessness Scale | r=-.231 p=.061 | r= .273 p=.023* |
| Frequency of Co-morbidities | r=.021 p=.439 | r=.090 p=.258 |
| Smoking | r=.240 p=.04* | r= -.176 p= .101 |
| Depression | r= .140 p=.156 | r= .531 p=.000*** |
| Catastrophising | r= .208 p= .065 | r=.416 p=.001*** |
| Total Mindfulness | r= .110 p=.219 | r= -.594 p=.000*** |
| Mindfulness-Describe | r=-.08 p=.288 | r= -.499 p=.000** |
| Mindfulness– Non-React | r= .260 p=.031* | r= .056 p= .347 |
| Mindfulness-Observe | r=.079 p=.289 | r=.046 p=.373 |
| Mindfulness - Aware | r= .015 p= .459 | r= -.527 p=.000** |
| Mindfulness-Non-Judgemental | r=-.015 p=.457 | r=-.527 p=.000** |

* p≤ .05, ** p≤.01, *** p≤.001

Hypothesis 2:

Anxiety will be positively correlated with catastrophising, depression, disease severity and perceived disability (breathlessness) and negatively correlated with mindfulness.

Anxiety scores were significantly positively correlated with breathlessness ($r = .273$, $p < .05$, $N = 54$), depression ($r = .531$, $p < .01$, $N = 54$), catastrophising ($r = .416$, $p \leq .001$, $N = 54$) and negatively correlated with overall mindfulness ($r = -.594$, $p \leq .001$, $N = 54$) and age ($r = -.299$, $p < .05$, $N = 54$). catastrophising

When the various facets of mindfulness were explored in relation to anxiety acting with awareness ($r = -.527$, $p \leq .01$, $N = 54$), non-judgemental ($r = -.527$, $p \leq .01$, $N = 54$) and describe ($r = -.499$, $p \leq .01$, $N = 54$) facets of mindfulness were significantly negatively correlated with anxiety.

Hypothesis 3

Catastrophising and trait mindfulness will be significant predictors of anxiety and frequency of COPD admissions to hospital when variance shared with confounding variables is controlled

Multivariate analysis based on Hierarchical Regression was utilised to explore Hypothesis 3. Variables which were shown to be possible confounders in previous research and had shown significance in the previous bivariate analysis were inputted into the model. Due to the limited sample size in the current research, all possible predictor variables were not included. A p-value of $\leq .05$ was considered to be statistically significant. The data set was explored to ensure it fulfilled the necessary assumptions related to multicollinearity, outliers, homoscedasticity and independence of residuals. The data did not break any of these assumptions and thus two regression models were created.

In the first Hierarchical Regression Model, Smoking and COPD severity, which were found to be significantly related to hospitalisations in the initial correlation analysis were inputted in the first step of the model as they were probable confounders. Catastrophising and Total Mindfulness were then inputted in the second stage of the model (See Table 2.4). The model as a whole predicted 16.3% of the variance in hospital admissions. The model as a whole is not significant ($F=2.294$, $p=.073$).

Table 2.4 Hierarchical Regression for Predicting Hospitalisations

| Independent Variable | B | t-value | p-value | F-value | p-value |
|----------------------|------|---------|---------|---------|---------|
| <u>Block 1</u> | | | | | |
| Smoking | .199 | 1.451 | .153 | 2.933 | .063 |
| COPD Severity | .225 | 1.642 | .107 | | |
| <u>Block 2</u> | | | | | |
| Catastrophising | .230 | 1.68 | .100 | 2.294 | .073 |
| Total Mindfulness | .135 | .962 | .341 | | |

In the second Hierarchical Regression Model, Age, Breathlessness and Depression, which were found to be significantly related to anxiety in the initial correlation analysis were inputted in the first step of the model as they were probable confounders. Catastrophising and Total Mindfulness were then inputted in the second stage of the model (See Table 2.6). The model as a whole predicts 52.9% of the variance in anxiety in those with COPD, with an additional 22.3% of this variance explained by Catastrophising and Overall Mindfulness. The model as a whole is significant ($F=12.438$, $p=.000$).

Table 2.5 Hierarchical Regression for Predicting Anxiety

| Independent Variable | B | t-value | p-value | F-value | p-value |
|----------------------|-------|---------|---------|---------|---------|
| <u>Block 1</u> | | | | | |
| Age | -.164 | -1.354 | .182 | 8.491 | .000** |
| Breathlessness | .181 | 1.518 | .136 | | |
| Depression | .464 | 3.837 | .000 | | |
| <u>Block 2</u> | | | | | |
| Catastrophising | .273 | 2.752 | .008 | 12.435 | .000** |
| Total Mindfulness | -.424 | -3.711 | .881 | | |

Discussion

The current study had two main aims. The first aim was to explore what psychological, illness-specific and demographic factors were associated with anxiety in COPD and whether catastrophising or mindfulness demonstrated any unique variance in predicting anxiety. The second aim was to explore what factors were associated with COPD hospital admissions and whether catastrophising or mindfulness demonstrated any unique variance in predicting hospitalisation.

In order to understand the study's findings, it is important to consider them in view of the sample study. The current sample was mostly representative of the COPD population with an almost equal mix in gender and a good age-range which has been noted as a limitation in previous studies (O'Brien & Morris, 2014). The majority of the current study reported more severe disease, a high rate of comorbidities and increased perceived breathlessness. It is therefore less likely that the findings from this study will be representative of those who are in the earlier stages of their COPD illness. There was a high prevalence of probable anxiety (78%) reported in the sample which is generally higher than the prevalence reported in previous studies (e.g. 41%, Gudmundsson et al, 2005). The scores on the measures of catastrophising, anxiety and depression were similar to those reported by Livermore et al (2012) in their research into panic in COPD and the scores for mindfulness were similar to those reported by Bohlmeijer et al (2011) in a sample with clinically relevant symptoms of depression and anxiety pre-therapeutic intervention.

In this study increased anxiety was statistically significantly related to increased breathlessness, catastrophising and depression. This is in line with previous research (Di Marco, Verga & Reggente, 2006; Kunik et al, 2005; Livermore et al, 2012). These findings in relation to anxiety support the cognitive model of anxiety (Clark, 1986), whereby internal sensations such as breathlessness can be misinterpreted as dangerous and result in an individual catastrophising and an increase in anxiety. Furthermore, increased anxiety was strongly correlated with reduced overall

mindfulness and specifically with reduced 'awareness', 'non-judgemental' and 'describe' facets. This is in line with previous research by Baer et al (2008) who suggest these facets are associated with fewer symptoms and lower anxiety. In the statistically significant hierarchical regression model for predicting anxiety, catastrophising and mindfulness predicted 22.3% of the variance in the model. These constructs have little or no research in COPD and our findings suggest they are worth further investigation.

In this study increased hospitalisation was significantly related to disease severity and smoking which again is inline with previous research (Godtfredsen et al, 2002; Wedzicha et al, 2007). Although not statistically significantly related to increased hospitalisations, catastrophising, anxiety and worse breathlessness exhibited a clear association. Catastrophising and mindfulness predicted 16.3% of the variance in hospitalisations. The 'non-reactivity' facet of mindfulness was positively related to hospitalisations, which is the opposite of what one might expect (Baer et al, 2008). In their study, Consedine & Butler, (2013) stated that 'non-reactivity' predicted less psychological appointments. However their sample were young healthy adults and the method of healthcare use monitoring was retrospective self-report of the past year, which may have resulted in a bias. Furthermore, in the current sample of those with COPD, being reactive to symptoms may act as a protective and sensible coping style, which may increase an individual's attention upon their symptoms thus resulting in increased hospital utilisation. Mindfulness scales have been criticised as the understanding of some scale items seem dependant on personal mindfulness practice (Grossman, 2008) and he further posits that there may be a significant difference between how mindful someone believes they are and how truly mindful they are.

The current sample of COPD patients demonstrated a high level of anxiety. Research has demonstrated that those who experience anxiety/depression are less likely to engage in self-management programmes e.g. pulmonary rehabilitation (Cassidy,

Turnball, Gardani & Kirkwood, 2012). Guidelines for COPD (NICE, 2010) recommend screening for distress. Coventry et al (2013) in a systematic review and meta-analysis demonstrated some evidence for the effectiveness of psychological and lifestyle interventions in reducing anxiety in those with COPD. A recent meta-analysis of mindfulness interventions for various psychological and medical conditions demonstrated a reduction in anxiety and mood symptoms (Hofman, Sawyer, Witt & Oh, 2010). Future intervention trials should be utilised to explore the effectiveness of interventions that included catastrophising and/or mindfulness on anxiety levels and hospitalisations in COPD.

As far as the author is aware, this is the first study to explore the role of catastrophising and mindfulness in relation to hospitalisations in COPD. From this study, it is clear that these cognitive factors may play a role in how people understand their illness experience and seek help from hospitals, even when controlling for other covariates. A clear strength of the current study is that information about healthcare use was gathered from hospital records. However only hospital admissions and not emergency room admissions or primary care use were recorded. A further strength is that a number of possible covariates were included in the analyses to try to understand the variance that the cognitive factors under study uniquely explained. However, in this study people were not asked about previous or ongoing pulmonary rehabilitation or community team involvement which may have impacted upon their hospital use. Evidence has demonstrated that pulmonary rehabilitation has a positive impact upon psychological distress (Coventry & Hind, 2007). The response rate of the current study was poor and thus may impact upon the representativeness of the sample. The current study is cross-sectional retrospective in design and thus we could not explore any causal relationships between the variables.

Identifying and improving the health of patients with COPD and preventing unnecessary hospitalisations is a key objective of healthcare professionals. This is the

first study to investigate overall mindfulness and the facets of mindfulness which specifically impact upon anxiety and hospital utilisation in those with COPD. The findings from this study should be treated with some caution due to the exploratory nature of this research. The conclusions warrant further scrutiny from well designed prospective studies to investigate these factors with a larger sample to ensure sufficient power and the avoidance of a Type II error.

The current study demonstrated that a high proportion of those who are hospitalised with COPD experienced anxiety for which higher catastrophising and lower mindfulness was a significant predictor. These findings suggest that it is important for healthcare professionals to assess psychological factors which may impact upon healthcare utilisation. Introducing psychological screening to the COPD care pathway could aid earlier detection of psychological distress and thus enable referral to appropriate services. Interventions focused upon these psychological factors may have an important impact upon a patient's health care experience, their healthcare utilisation and upon the economic costs of COPD patients. Coventry et al (2013) suggest that there is some evidence for the effectiveness of psychological interventions for reducing anxiety in those with COPD. Further research studies utilising a psychological intervention based upon catastrophising and/or mindfulness and its impact upon anxiety and hospitalisations could increase our knowledge about possible ways to reduce unnecessary hospitalisations and reduce financial expenditure.

References

- American Thoracic Society. (1999). Dyspnea Mechanisms, assessment, and management: a consensus statement. *American Journal of Respiratory Critical Care Med*, 159, 321-340.
- Andenaes, R., & Kalfoss, M.H. (2004). Psychological distress in hospitalized patients with chronic obstructive pulmonary disease. *European Journal of Epidemiology*, 19(9), 851-9.
- Atlantis, E., Fahey, P., Cochrane, B., & Smith, S. (2013). Bidirectional associations between clinically relevant depression or anxiety and COPD: a systematic review and meta-analysis. *Chest*, 144(3), 766 – 777.
- Audit Scotland (2007). *Managing Long-term Conditions*. Available from: http://www.audit-scotland.gov.uk/utilities/search_report.php?id=552
- Baer, R. A., Smith, G. T., Hopkins, J., et al. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 13(1), 27-45.
- Baer, R. A., Smith, G. T., Lykins, E., et al. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and non-meditating samples. *Assessment*, 15(3), 329-42.
- Baraniak, A., Sheffield, D. (2011). The efficacy of psychologically based interventions to improve anxiety, depression and quality of life in COPD: a systematic review and meta-analysis. *Patient Education and Counselling*, 83(1), 29-36.
- Benzo, R., Chang, C.H., Farrell, M., Kaplan, R., Ries, A., Martinez, F.J..... Sciurba, F. (2010). Physical activity, health status, anxiety and risk of hospitalization in patients with severe chronic obstructive pulmonary disease. *Respiration*, 80, 10-18.
- Bestall, J. C., Paul, E. A., Garrod, R., Garnham, R., Jones, P. W., & Wedzicha, J. A. (1999). Usefulness of the Medical Research Council (MRC) dyspnoea scale as a

measure of disability in patients with chronic obstructive pulmonary disease. *Thorax*, 54, 581-586.

Bishop, S.R., Lau, M., Shapiro, S., Carlson, L., Anderson, L., Carmody J. et al. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice*, 11, 230–242.

Bjelland, I., Dahl, A., Haug, T. & Neckelmann, D. (2002). The validity of the Hospital Anxiety and Depression Scale - An updated literature review. *Journal of Psychosomatic Research*, 52(2), 69-77.

Bohlmeijer, E., Ten Klooster, P. M., Fledderus, M., Veehof, M., & Baer, R. (2011). Psychometric properties of the Five Facet Mindfulness Questionnaire in depressed adults and development of a short form. *Assessment*, 18, 308–320.

Booker, R. (2005). Chronic obstructive pulmonary disease and the NICE guideline. *Nursing Standard*. 19 (22), 43-52.

British Lung Foundation. (2007). *Invisible Lives. Chronic Obstructive Pulmonary Disease (COPD) – finding the missing millions*. Available from: <http://www.blf.org.uk/Publication/Detail/Invisible-Lives-report>

British Psychological Society (2010). *Code of Human Research Ethics*. Retrieved 12/02/2013.

http://www.bps.org.uk/sites/default/files/documents/code_of_human_research_ethics.pdf

Brown, K. W., & Ryan, R. M. (2003). The benefit of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, 84, 822–848.

Cassidy, E., Atherton, R., Robertson, N., Walsh, D., & Gillett, R. (2012). Mindfulness, functioning and catastrophising after multidisciplinary pain management for chronic low back pain. *Pain*, 153 (3), 644-650.

- Cao, Z., Ong, K.C., Eng, P., Tan, W.C. & Ng, T.P. (2006). Frequent hospital readmissions for acute exacerbation of COPD and their associated factors. *Respirology* 11: 188-195.
- Clark, D.M. (1986). A cognitive approach to panic. *Behaviour Research Therapy*, 24(4), 461-470.
- Coffey, K.A., Hartman, M., & Fredrickson, B.L. (2010). Deconstructing mindfulness and constructing mental health: Understanding mindfulness and its mechanisms of action. *Mindfulness*, 1, 235–253.
- Coventry, P.A., Gemmell, I. & Todd, C.J. (2011). Psychosocial risk factors for hospital readmission in COPD patients on early discharge services: a cohort study. *BMC Pulmonary Medicine*, 11: 49.
- Coventry, P., Bower, P., Keyworth, C., Kenning, C., Knopp, J, Garrett, C.....Dickens, C. (2013). The effect of complex interventions on depression and anxiety in COPD: Systematic Review and Meta-Analysis. *PLOS ONE*, 8 (4) e60532
- Dahlén, I. & Janson, C. (2002). Anxiety and depression are related to the outcome of emergency treatment in patients with obstructive pulmonary disease. *Chest*, 122, 1633-7.
- Dennis, R., Boddington, S. & Funnell, J. (2007). Self-report measures of anxiety: are they suitable for older adults? *Aging Mental Health*, 11(6), 668-77.
- Erisman, S. M., & Roemer, L. (2012). Mindfulness Process Questionnaire: A preliminary investigation of the process of mindfulness. *Mindfulness*, 3, 30-43.
- Fan, V.S. , Ramsey, S.D. , Giardino, N.D., Make, B.J., Emery, C.F., Diaz, P.T....., Martinez, F.J. (2007). Sex, Depression, and Risk of Hospitalization and Mortality in Chronic Obstructive Pulmonary Disease. *Archives of Internal Medicine*, 167(21), 2345-2353.
- Fan, V.S., Giardino, N.D., Blough, D.K., Kaplan, R.M., Ramsey, S.D. (2008). Nett Research Group. Costs of pulmonary rehabilitation and predictors of adherence in the National Emphysema Treatment Trial. *COPD*, 5(2), 105–116.

Garcia-Aymerich, J., Lange, P., Benet, M., Schnohr, P. & Antó, J.M. (2006). Regular physical activity reduces hospital admission and mortality in chronic obstructive pulmonary disease: a population based cohort study. *Thorax*, 61, 772-778.

Global Initiative for Chronic Obstructive Lung Disease (GOLD). (updated 2010). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. Available at: <http://www.goldcopd.org/guidelines-global-strategyfor-diagnosis-management.html>. Accessed 4 February 2013

Grossman P. (2008). On measuring mindfulness in psychosomatic and psychological research. *Journal Psychosomatic Research* 6,405–408.

Gudmundsson, G., Gislason, T., Janson, C., Lindberg, E., Hallin, R., Ulrik,Bakke, P. (2005). Risk factors for rehospitalisation in COPD: role of health status, anxiety and depression. *European Respiratory Journal*, 26, 414–19.

Gurney-Smith, B., Cooper, M. & Wallace, L. (2002). Anxiety and Panic in Chronic Obstructive Pulmonary Disease: The Role of Catastrophic Thoughts. *Cognitive Therapy and Research*, 26 (1), 143–155.

Haworth, J., Moniz-Cook E., Clark, M., Wang, A. & Cleland, J. (2007). An evaluation of two self-report screening measures for mood in an out-patient chronic heart failure population. *International Journal of Geriatric Psychiatry*, 22, 1147–1153.

Hayes, S.C., Wilson, K.G., Gifford, E.V., Follette, V.M., & Strosahl, K. (1996). Experiential avoidance and behavioural disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology*, 64(6), 1152–1168.

Herrmann, C. (1997). International experiences with the Hospital Anxiety and Depression Scale — a review of validation data and clinical results. *Journal of Psychosomatic Research*, 42, 17-41.

- Heslop, K. (2009.) Using individualised cognitive behavioural therapy as a treatment for people with COPD . *Nursing Times*, 105, 14-15.
- Hill, K., Geist, R., Goldstein, R.S., Lacasse, Y. (2008). Anxiety and depression in end-stage COPD. *European Respiratory Journal*, 31(3), 667-77.
- Hoth, K., Wamboldt, F., Bowler, R., Make, B., & Holm, K. (2011).Attributions about Cause of Illness in Chronic Obstructive Pulmonary Disease. *Journal of Psychosomatic Research*, 70(5), 465–472.
- Hyland, M.E., Jones, R.C., Hanney, K.E. (2006). The Lung Information Needs Questionnaire: Development, preliminary validation and findings. *Respiratory Medicine*, 100(10), 1807-16.
- Jahagirdar, D. Kroll, T., Ritchie, K. & Wyke, S. (2013). Patient-Reported Outcome Measures for Chronic Obstructive Pulmonary Disease, The Exclusion of People with Low Literacy Skills and Learning Disabilities. *Patient*, 6, 11–21.
- Howard, C., Dupont, S., Haselden, B., Lynch, J. & Wills, P. (2010). The effectiveness of a group cognitive-behavioural intervention on health status, mood and hospital admissions in elderly patients with chronic obstructive pulmonary disease. *Psychology, Health & Medicine*, 15, 371-385.
- Kaptein, A., Scharloo, M., Fischer, M.J., Snoei, L., Cameron, L., Sont, J., Rabe, K. & Weinman J. (2008). Illness perceptions and COPD: an emerging field for COPD patient management. *Journal of Asthma*, 45(8), 625-9.
- Keng, S., Smoski, M. & Robins, C. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review*, 31(6), 1041–1056.
- Kim, H.F.S., Kunik, M.E., Molinari, V.A., Hillman, S.L., Lalani, S., Orengo, C.A.....Goodnight-White, S. (2000). Functional impairment in COPD patients: the impact of anxiety and depression. *Psychosomatics*, 41, 465-471.

- Livermore, N., Butler, J.E., Sharpe, L., McBain, R.A., et al. (2008). Panic attacks and perception of inspiratory resistive loads in chronic obstructive pulmonary disease. *American Journal of Respiratory and Critical Care Medicine* 178(1), 7-12.
- Livermore, N., Sharpe, L., McKenzie, D. (2010) Prevention of panic attacks and panic disorder in COPD. *European Respiratory Journal*, 35(3), 557-563.
- Livermore, N., Sharpe, L., McKenzie, D. (2012). Catastrophic interpretations and anxiety sensitivity as predictors of panic-spectrum psychopathology in chronic obstructive pulmonary disease. *Journal of Psychosomatic Research*, 72(5), 388-92.
- Lothian Respiratory MCN. (2011). Lothian Respiratory Managed Clinical Network Annual Report 2010 – 2011. *NHS Lothian*, Edinburgh.
- Mahler, D.A., & Wells, C.K. (1988). Evaluation of clinical methods for rating dyspnea. *Chest*, 93, 580–586.
- McCracken, L.M., Gauntlett-Gilbert, J., Vowles, K.E. (2007). The role of mindfulness in a contextual cognitive-behavioral analysis of chronic pain-related suffering and disability. *Pain*, 131, 63–69.
- Moorey, S., Greer, S., Watson, M., (1991). The factor structure and factor stability of the Hospital Anxiety and Depression Scale in patients with cancer. *British Journal of Psychiatry*, 158, 255-259.
- Mularski, R.A., Munjas, B.A., Lorenz, K.A., Sun, S., Robertson, S.J., (2012). Randomized controlled trial of mindfulness-based therapy for dyspnea in chronic obstructive lung disease. *Journal of Alternative Complementary Medicine*, 15, 1083–1090.
- Murray, C. J. L., & Lopez, A. D. (1997). Alternative projections of mortality and disability by cause 1990–2020: Global Burden of Disease Study. *The Lancet*, 349, 1498–1504.
- National Institute for Clinical Excellence (NICE). (2004). Chronic obstructive pulmonary disease: national clinical guideline for management of chronic obstructive pulmonary disease in adults in primary and secondary care. *Thorax*, 59, 1-232.

National Institute for Clinical Excellence (NICE). (2010). Chronic obstructive pulmonary disease: Management of chronic obstructive pulmonary disease in adults in primary and secondary care (Partial Update). Available from: <http://publications.nice.org.uk/chronic-obstructive-pulmonary-disease-cg101>.

Accessed March 1, 2013.

Ng, T.P., Niti, M., Tan, W.C., Cao, Z., Ong, K.C., Eng, P. (2007). Depressive symptoms and chronic obstructive pulmonary disease: effect on mortality, hospital readmission, symptom burden, functional status, and quality of life . *Archives of Internal Medicine*, 167(1), 60 – 67.

NHS Quality Improvement Scotland (NHS QIS). (2010). Chronic Obstructive Pulmonary Disease

Services Clinical Standards. Available from:

http://www.healthcareimprovementscotland.org/our_work/long_term_conditions/copd_implementation/copd_clinical_standards.aspx

O' Brien. G. & Morris, P.G. (2014), *Does anxiety impact upon hospital admissions? A systematic Review*. Thesis, Univeristy of Edinburgh.

Roberts, N., Ghiassi, R. & Partridge, M. (2008). Health Literacy in COPD. *International Journal of COPD*, 3(4) 499–507.

Schlomer, G., Bauman, S. & Card, N. (2010). Best Practices for Missing Data Management in Counseling Psychology, *Journal of Counseling Psychology*, 57, (1), 1–10.

Schütz, R., Rees, C., Preece, M. & Schütze, M. (2010). Low Mindfulness Predicts Pain Catastrophising in a Fear-Avoidance Model of Chronic Pain, *Pain*, 148, 120-127.

Scottish Executive (2003). NHS Code of Practice on Protecting Patient Confidentiality.

http://elearning.scot.nhs.uk:8080/intralibrary/open_virtual_file_path/i123n1168626t/6074NHSCode.pdf. Accessed 12th February 2013.

Seamark, D.A., Seamark, C.J., Halpin, D. (2007). Palliative care in chronic obstructive pulmonary disease: a review for clinicians. *Journal of the Royal Society of Medicine*, 100, 225–33.

Smoller, J. & Otto, M. (1998). Panic, dyspnea and asthma. *Current Opinion Pulmonary Medicine*, 4, 40–45.

Sullivan, P.F., Neale, M.C. & Kendler, K.S. (2000). Genetic epidemiology of major depression: Review and meta-analysis. *American Journal of Psychiatry*, 157, 1552–1562.

Sundha, J., Jansonb, C., Lisspersc, K., Ställbergc, B. & Montgomery, S. (2012). The Dyspnoea, Obstruction, Smoking, Exacerbation (DOSE) index is predictive of mortality in COPD. *Primary Care Respiratory Journal*, 21(3), 295-301.

Sutton, K., Cooper, M., Pimm, J. & Wallace, L. (1999). Anxiety in chronic obstructive pulmonary disease: the role of catastrophic thoughts. *Cognitive Therapy and Research*, 23(6), 573-585.

Taylor, J., Dawson, S., Sridhar, M. (2005). Functional illiteracy amongst those with chronic obstructive pulmonary disease (COPD). *European Respiratory Journal*, 26:57s.

Wedzicha, J.A. & Hurst, J.R. (2007). Chronic obstructive pulmonary disease exacerbation and risk of pulmonary embolism. *Thorax*, 62 (2), 103-104.

White, P., White, S., Edmonds, P., Gysels, M., et al. (2011). Palliative care or end-of-life care in advanced chronic obstructive pulmonary disease: a prospective community survey. *British Journal of General Practice*, 61, 362-70.

Wolf, M.S., Gazmararian, J.A., Baker, D.W. (2005). Health Literacy and Functional Health Status Among Older Adults. *Arch Intern Med*, 165,1946–52.

Xu, W., Collet, J.P., Shapiro, S., Lin, Y., Yang, T., Platt, R.W..... Bourbeau, J. (2008). Independent effect of depression and anxiety on chronic obstructive pulmonary disease exacerbations and hospitalizations. *American Journal of Respiratory and Critical Care Medicine*, 178 (9), 913 – 920.

Yohannes, A.M., Willgoss, T.G., Baldwin, R.C., Connolly, M.J. (2010). Depression and anxiety in chronic heart failure and chronic obstructive pulmonary disease: prevalence, relevance, clinical implications and management principles. *International Journal of Geriatric Psychiatry*, 25(12), 1209 – 1221.

Zigmond, A. & Snaith, R. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica*, 67, 361–370.

Zvolensky, M.J., Solomon, S.E., McLeish, A.C., Cassidy, D., Bernstein, A., Bowman, C.J., & Yartz, A.R. (2006). Incremental validity of mindfulness-based attention in relation to the concurrent prediction of anxiety and depressive symptomology and perceptions of health. *Cognitive Behaviour Therapy*, 35, 148–158.

Zwerink, M., Brusse-Keizer, M., van der Valk, P.D.L.P.M., Zielhuis, G.A., Monninkhof, E.M., van der Palen, J., Frith, P.A., & Effing, T. (2014). Self management for patients with chronic obstructive pulmonary disease (Review). *Cochrane Database of Systematic Reviews*, Issue 3. Art.

Chapter 3: Additional Methodology Chapter

This chapter will describe in greater detail the methodological procedures undertaken in the current research study. It will be divided into two subheadings: 1) Ethical issues and approval and 2) Measures.

3. 1 Ethical Issues & Approval

Ethical Approval

The research proposal was initially reviewed by a member of the Doctorate in Clinical Psychology Team. Feedback from this review was then incorporated into the research proposal. NHS ethical approval for the research study was then obtained from the South East Scotland Research Ethics Committee.

Consenting Process

The participant information sheet (See Appendix E) gave detailed information about the current study including information about confidentiality and consent. The participant information sheet emphasised that participants could leave the study at any time and that this would not have any impact on any treatment they received. If a potential participant was interested in taking part in the current research study, they were asked to complete and sign the consent form (See appendix F). Participants were asked to give permission for anonymised research data to be stored and/or examined by NHS Lothian and regulatory authorities for monitoring purposes and for their anonymised data to be used in future research project if of public interest. They were informed that their GP would be notified that they were taking part in the research study.

Confidentiality

The recommendations of the NHS Code of Practice on Protecting Patient Confidentiality (Scottish Executive, 2003) and the Code of Human Research Ethics (British Psychological Society, 2010) informed the current procedure.

Data about potential participants (e.g. name, contact details and number of COPD related hospital admissions) was initially gathered by a data manager within NHS Lothian. The list of potential participants was given to a member of the respiratory team who was already a part of their direct clinical care team. They sent out the questionnaire pack to the selected potential participants. No personal information about potential participants was given to the Chief Investigator prior to consent being obtained from the participants themselves.

Participants' names and signature appeared on the paper consent forms. A study number was utilised on the questionnaire pack to allow the researcher to link the consent form with the questionnaire pack so that the data could be located if a participant decided to withdraw from the study. The consent form was separated from the rest of the questionnaire pack. Consent forms and completed questionnaire packs were stored separately in a locked filing cabinet on NHS premises.

All identifying information was removed from the research data when it was transferred to a statistical package for analysis to ensure confidentiality. Furthermore no identifying information was used in the write-up of the research for publication.

3. 2 Measures

Readability

COPD is more prevalent in older adults and in lower socio-economic groups where low levels of literacy are common (Jahagirdar et al, 2013; Wolf et al, 2005). A British outpatient study of COPD patients demonstrated that 15% of patients were not able to use written information (Taylor et al 2005). Roberts and colleagues (2008) recommend that written materials for those with COPD should be tested for levels of readability to ensure accessibility. A readability assessment, of the current questionnaires indicated Flesch Reading Ease (FRE) scores of between 85.9 and 60.7 i.e. ranging from an 'easy' to 'standard' readability level. The higher the FRE score the easier the document is to read. The Scottish Executive (2006) recommends that most standard documents should aim for a score of approximately 60 to 70. The questionnaire pack's rating thus falls within the recommended 'standard' readability levels.

Complete Reference List

- Abrams, T., Vaughan-Sarrazin, M. & Vander-Weg, M. (2011). Acute Exacerbations of Chronic Obstructive Pulmonary Disease and the Effect of Existing Psychiatric Comorbidity on Subsequent Mortality. *Psychosomatics*, 52, 441-449.
- Alcázar, B, García-Polo, C., Herrejón, A., Ruiz, L.A., de Miguel, J., Ros, J.A.....
Miravittles M. (2012). Factors associated with hospital admission for exacerbation of chronic obstructive pulmonary disease. *Archivos De Bronconeumologia*, 48 (3), 70-76.
- Almagro, P., Barreiro, B., Ochoa de Echaguen, A., Quintana, S., Rodriguez Carballeira, M., Heredia, J.L. & Garau, J. (2006). Risk factors for hospital readmission in patients with chronic obstructive pulmonary disease. *Respiration*, 73, 311-317.
- American Thoracic Society. (1999). Dyspnea Mechanisms, assessment, and management: a consensus statement. *American Journal of Respiratory Critical Care Med*, 159, 321-340.
- Andenaes, R., & Kalfoss, M.H. (2004). Psychological distress in hospitalized patients with chronic obstructive pulmonary disease. *European Journal of Epidemiology*, 19(9), 851-9.
- Atlantis, E., Fahey, P., Cochrane, B., & Smith, S. (2013). Bidirectional associations between clinically relevant depression or anxiety and COPD: a systematic review and meta-analysis. *Chest*, 144(3), 766 – 777.
- Audit Scotland (2007). *Managing Long-term Conditions*. Available from:
http://www.audit-scotland.gov.uk/utilities/search_report.php?id=552
- Baer, R. A., Smith, G. T., Hopkins, J., et al. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 13(1), 27-45.

Baer, R. A., Smith, G. T., Lykins, E., et al. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and non-meditating samples. *Assessment*, 15(3), 329-42.

Bailey, P. (2004). The Dyspnea-Anxiety-Dyspnea Cycle—COPD Patients' Stories of Breathlessness: "It's Scary /When you Can't Breathe." *Qualitative Health Research*, 14(6), 760-778.

Baraniak, A., Sheffield, D. (2011). The efficacy of psychologically based interventions to improve anxiety, depression and quality of life in COPD: a systematic review and meta-analysis. *Patient Education and Counselling*, 83(1), 29-36.

Beck, A.T., Epstein, N., Brown, G., Steer, R.A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology*, 56, 893–897.

Benzo, R., Chang, C.H., Farrell, M., Kaplan, R., Ries, A., Martinez, F.J..... Sciurba, F. (2010). Physical activity, health status, anxiety and risk of hospitalization in patients with severe chronic obstructive pulmonary disease. *Respiration*, 80, 10-18.

Bestall, J. C., Paul, E. A., Garrod, R., Garnham, R., Jones, P. W., & Wedzicha, J. A. (1999). Usefulness of the Medical Research Council (MRC) dyspnoea scale as a measure of disability in patients with chronic obstructive pulmonary disease. *Thorax*, 54, 581-586.

Bishop, S.R., Lau, M., Shapiro, S., Carlson, L., Anderson, L., Carmodym J. et al. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice*, 11, 230–242.

Bjelland, I., Dahl, A., Haug, T. & Neckelmann, D. (2002). The validity of the Hospital Anxiety and Depression Scale - An updated literature review. *Journal of Psychosomatic Research*, 52(2), 69-77.

Bohlmeijer, E., Ten Klooster, P. M., Fledderus, M., Veehof, M., & Baer, R. (2011). Psychometric properties of the Five Facet Mindfulness Questionnaire in depressed adults and development of a short form. *Assessment*, 18, 308–320.

Booker, R. (2005). Chronic obstructive pulmonary disease and the NICE guideline. *Nursing Standard*. 19 (22), 43-52.

British Lung Foundation. (2007). *Invisible Lives. Chronic Obstructive Pulmonary Disease (COPD) – finding the missing millions*, <http://www.blf.org.uk/Publication/Detail/Invisible-Lives-report>

British Psychological Society (2010). *Code of Human Research Ethics*. Retrieved 12/02/2013.

http://www.bps.org.uk/sites/default/files/documents/code_of_human_research_ethics.pdf

Brown, T. A., DiNardo, P. A., & Barlow, D. H. (1994). *Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV)*. San Antonio, TX: Psychological Corporation.

Brown, T. A., Di Nardo, P. A., Lehman, C. L., & Campbell, L. A. (2001). Reliability of *DSM-IV* anxiety and mood disorders: Implications for the classification of emotional disorders. *Journal of Abnormal Psychology*, 110, 49-58.

Brown, K. W., & Ryan, R. M. (2003). The benefit of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, 84, 822–848.

Cao, Z., Ong, K.C., Eng, P., Tan, W.C. & Ng, T.P. (2006). Frequent hospital readmissions for acute exacerbation of COPD and their associated factors. *Respirology* 11: 188-195.

Cassidy, E., Atherton, R., Robertson, N., Walsh, D., & Gillett, R. (2012). Mindfulness, functioning and catastrophising after multidisciplinary pain management for chronic low back pain. *Pain*, 153 (3), 644-650.

Chief Medical Officer. (2004). Annual report of the chief medical officer on the state of public health. Department of Health Publications.

Clark, D.M. (1986). A cognitive approach to panic. *Behaviour Research Therapy*, 24(4), 461-470.

Coffey, K.A., Hartman, M., & Fredrickson, B.L. (2010). Deconstructing mindfulness and constructing mental health: Understanding mindfulness and its mechanisms of action. *Mindfulness*, 1, 235–253.

Connors, A.F., Dawson, N.V., Thomas, C., Harrell, F.E., Desbiens, D., Fulkerson, W.J..... Knaus, A. (1996). Outcomes following acute exacerbation of severe chronic obstructive lung disease. *American Journal of Respiratory and Critical Care Medicine*, 154(4), 959-67.

Copeland, J.R., Kelleher, M.J., Kellett, J.M., Gourlay, A.J., Gurland, B.J., Fleiss, J.L., & Sharpe, L. (1976). A semi-structured clinical interview for the assessment of diagnosis and mental state in the elderly: the geriatric mental state schedule. I. Development and reliability. *Psychological Medicine*, 6(3), 439–449.

Coventry, P.A. & Hind, D. (2007). Comprehensive pulmonary rehabilitation for anxiety and depression in adults with chronic obstructive pulmonary disease: systematic review and meta-analysis. *Journal of Psychosomatic Research*, 63(5), 551-565.

Coventry, P.A., Gemmell, I. & Todd, C.J . (2011). Psychosocial risk factors for hospital readmission in COPD patients on early discharge services: a cohort study. *BMC Pulmonary Medicine*, 11: 49.

Crockett, A.J., Cranston, J.M., Moss, J.R., & Alpers, J.H. (2002). The impact of anxiety, depression and living alone in chronic obstructive pulmonary disease. *Quality of Life Research*, 11 (4), 309-316.

Dahlén, I. & Janson, C. (2002). Anxiety and depression are related to the outcome of emergency treatment in patients with obstructive pulmonary disease. *Chest*, 122, 1633-7.

Dennis, R., Boddington, S. & Funnell, J. (2007). Self-report measures of anxiety: are they suitable for older adults? *Aging Mental Health*, 11(6), 668-77.

- Easterbrook, P.J., Berlin, J.A., Gopalan, R., & Matthews, D.R. (1991). Publication bias in clinical research. *Lancet*, 337, 867–872.
- Eisner, M.D. , Blanc, P.D. , Yelin, E.H. , Katz, P., Sanchez, G., Iribarren, C. & Omachi, T. (2010). The influence of anxiety on health outcomes in COPD. *Thorax*, 65(3), 229 – 234.
- Erisman, S. M., & Roemer, L. (2012). Mindfulness Process Questionnaire: A preliminary investigation of the process of mindfulness. *Mindfulness*, 3, 30-43.
- Evans, K.C., Banzett, R.B., Adams, L., McKay, L., Frackowiak, & R.S., Corfield, D.R. (2002). BOLD fMRI identifies limbic, paralimbic, and cerebellar activation during air hunger. *Journal of Neurophysiology* 88, 1500 – 1511.
- Fan, V.S. , Ramsey, S.D. , Giardino, N.D., Make, B.J., Emery, C.F., Diaz, P.T....., Martinez, F.J. (2007). Sex, Depression, and Risk of Hospitalization and Mortality in Chronic Obstructive Pulmonary Disease. *Archives of Internal Medicine*, 167(21), 2345-2353.
- Fan, V.S., Giardino, N.D., Blough, D.K., Kaplan, R.M., Ramsey, S.D. (2008). Net Research Group. Costs of pulmonary rehabilitation and predictors of adherence in the National Emphysema Treatment Trial. *COPD*, 5(2), 105–116.
- Gadoury, M.A., Schwartzman, K., Rouleau, M., Maltais, F., Julien, M, Beaupré, A..... Bourbeau, J. (2005) Self-management reduces both short and long-term hospitalisation in COPD. *European Respiratory Journal*, 26(5), 853-7.
- Garcia-Aymerich, J., Farrera, E., Félez, M.A., Izquierdo, J., Marrades, R.M. & Antó, J.M. (2003). Risk factors of readmission to hospital for a COPD exacerbation: a prospective study. *Thorax*, 58(2), 100–105.
- Garcia-Aymerich, J., Lange, P., Benet, M., Schnohr, P. & Antó, J.M. (2006). Regular physical activity reduces hospital admission and mortality in chronic obstructive pulmonary disease: a population based cohort study. *Thorax*, 61, 772-778.

Ghanei, M., Aslani, J., AzizAbadi-Farahani, M., Assari, S. &, Saadat, S. H. (2007). Logistic regression model to predict chronic obstructive pulmonary disease exacerbation. *Archives of Medical Science*, 3 (4), 360-366.

Global Initiative for Chronic Obstructive Lung Disease (GOLD). (updated 2010). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. Available at: <http://www.goldcopd.org/guidelines-global-strategyfor-diagnosis-management.html>. Accessed 4 February 2013

Gough, D., Oliver, S. & Thomas, J. (2012). *An introduction to Systematic Reviews*. Croyden, UK: Sage Publications.

Gudmundsson, G., Gislason, T., Janson, C., Lindberg, E., Hallin, R., Ulrik,Bakke, P. (2005). Risk factors for rehospitalisation in COPD: role of health status, anxiety and depression. *European Respiratory Journal*, 26, 414–19.

Gudmundsson, G., Gislason, T., Janson, C., Lindberg, E., Suppli Ulrik, C., Brøndum, E., et al. (2006). Depression, anxiety and health status after hospitalisation for COPD: a multicentre study in the Nordic countries. *Respiratory Medicine*, 100(1), 87-93.

Gurney-Smith, B., Cooper, M. & Wallace, L. (2002). Anxiety and Panic in Chronic Obstructive Pulmonary Disease: The Role of Catastrophic Thoughts. *Cognitive Therapy and Research*, 26 (1), 143–155.

Haworth, J., Moniz-Cook E., Clark, M., Wang, A. & Cleland, J. (2007). An evaluation of two self-report screening measures for mood in an out-patient chronic heart failure population. *International Journal of Geriatric Psychiatry*, 22, 1147–1153.

Hayes, S.C., Wilson, K.G., Gifford, E.V., Follette, V.M., & Strosahl, K. (1996). Experiential avoidance and behavioural disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology*, 64(6), 1152–1168.

Herrmann, C. (1997). International experiences with the Hospital Anxiety and Depression Scale — a review of validation data and clinical results. *Journal of Psychosomatic Research*, 42, 17-41.

Heslop, K. (2009.) Using individualised cognitive behavioural therapy as a treatment for people with COPD . *Nursing Times*, 105, 14-15.

Hill, K., Geist, R., Goldstein, R.S., Lacasse, Y. (2008). Anxiety and depression in end-stage COPD. *European Respiratory Journal*, 31(3), 667-77.

Hoth, K., Wamboldt, F., Bowler, R., Make, B., & Holm, K. (2011). Attributions about Cause of Illness in Chronic Obstructive Pulmonary Disease. *Journal of Psychosomatic Research*, 70(5), 465–472.

Howard, C., Dupont, S., Haselden, B., Lynch, J. & Wills, P. (2010). The effectiveness of a group cognitive-behavioural intervention on health status, mood and hospital admissions in elderly patients with chronic obstructive pulmonary disease. *Psychology, Health & Medicine*, 15, 371-385.

Hyland, M.E., Jones, R.C., Hanney, K.E. (2006). The Lung Information Needs Questionnaire: Development, preliminary validation and findings. *Respiratory Medicine*, 100(10), 1807-16.

Jahagirdar, D. Kroll, T., Ritchie, K. & Wyke, S. (2013). Patient-Reported Outcome Measures for Chronic Obstructive Pulmonary Disease, The Exclusion of People with Low Literacy Skills and Learning Disabilities. *Patient*, 6, 11–21.

Kaplan, R.M., Bush, J.W., & Berry, C.C. (1976). Health status: Types of validity for an Index of Well-being. *Health Services Research*, 478-507.

Kaplan, R.M., Anderson, J.P., & Ganiats, T.G. (1993). The Quality of Well-being Scale: rationale for a single quality of life index. In S.R. Walker & R.M. Rosser (eds) *Quality of life assessment: Key issues in the 1990s*. London: Kluwer Academic Publishers, 65-94.

- Kaptein, A., Scharloo, M., Fischer, M.J., Snoei, L., Cameron, L., Sont, J., Rabe, K. & Weinman J. (2008). Illness perceptions and COPD: an emerging field for COPD patient management. *Journal of Asthma*, 45(8), 625-9.
- Keng, S., Smoski, M. & Robins, C. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review*, 31(6), 1041–1056.
- Kim, H.F.S., Kunik, M.E., Molinari, V.A., Hillman, S.L., Lalani, S., Orengo, C.A.....Goodnight-White, S. (2000). Functional impairment in COPD patients: the impact of anxiety and depression. *Psychosomatics*, 41, 465-471.
- Laurin, C., Labrecque, M., Dupuis, G., Bacon, S.L., Cartier, A. & Lavoie, K.L. (2009). Chronic obstructive pulmonary disease patients with psychiatric disorders are at greater risk of exacerbations . *Psychosomatic Medicine*, 71(6), 667 – 674.
- Laurin, C., Moullec, G., Bacon, S.L. & Lavoie, K.L. (2012) Impact of anxiety and depression on chronic obstructive pulmonary disease exacerbation risk. *American Journal of Respiratory and Critical Care Medicine*, 185(9), 918 – 923.
- Livermore, N., Butler, J.E., Sharpe, L., McBain, R.A., et al. (2008). Panic attacks and perception of inspiratory resistive loads in chronic obstructive pulmonary disease. *American Journal of Respiratory and Critical Care Medicine* 178(1), 7-12.
- Livermore, N., Sharpe, L., McKenzie, D. (2010) Prevention of panic attacks and panic disorder in COPD. *European Respiratory Journal*, 35(3), 557-563.
- Livermore, N., Sharpe, L., McKenzie, D. (2012). Catastrophic interpretations and anxiety sensitivity as predictors of panic-spectrum psychopathology in chronic obstructive pulmonary disease. *Journal of Psychosomatic Research*, 72(5), 388-92.
- Lothian Respiratory MCN. (2011). Lothian Respiratory Managed Clinical Network Annual Report 2010 – 2011. *NHS Lothian*, Edinburgh.
- Mahler, D.A., & Wells, C.K. (1988). Evaluation of clinical methods for rating dyspnea. *Chest*, 93, 580–586.

- Mannino, D.M. & Buist, A.S. (2007). Global burden of COPD: risk factors, prevalence, and future trends. *Lancet*, 370, 765–773.
- Mannino, D.M., Homa, D.M., Akinbami, L.J., Ford, E.S., & Redd, S.C. (2002). Chronic obstructive pulmonary disease surveillance: United States, 1971–2000. *Morbidity and mortality weekly report. Surveillance summaries*, 51(6), 1-16.
- Martin, C.R. (2005). What does the Hospital Anxiety and Depression Scale (HADS) really measure in liaison psychiatry settings? *Current Psychiatry Reviews*, 1, 69-73.
- Maurer, J., Rebbapragada, V., Borson, S., Goldstein, R., Kunik, M.E., Yohannes, A.M., & Hanania, N.A. (2008). Anxiety and depression in COPD: current understanding, unanswered questions, and research needs. *Chest*, 134 (4), suppl 43S - 56S.
- McCracken, L.M., Gauntlett-Gilbert, J., Vowles, K.E. (2007). The role of mindfulness in a contextual cognitive-behavioral analysis of chronic pain-related suffering and disability. *Pain*, 131, 63–69.
- Miravittles, M., Guerrero, T., Mayordomo, C., Sánchez-Agudo, L., Nicolau, F. & Segú J.L. (2000). Factors associated with increased risk of exacerbation and hospital admission in a cohort of ambulatory COPD patients: a multiple logistic regression analysis. *Respiration*, 67, 495–501.
- Moorey, S., Greer, S., Watson, M., et al (1991). The factor structure and factor stability of the Hospital Anxiety and Depression Scale in patients with cancer. *British Journal of Psychiatry*, 158, 255-259.
- Mularski, R.A., Munjas, B.A., Lorenz, K.A., Sun, S., Robertson, S.J., et al. (2012). Randomized controlled trial of mindfulness-based therapy for dyspnea in chronic obstructive lung disease. *Journal of Alternative Complementary Medicine*, 15, 1083–1090.
- Murray, C. J. L., & Lopez, A. D. (1997). Alternative projections of mortality and disability by cause 1990–2020: Global Burden of Disease Study. *The Lancet*, 349, 1498–1504.

National Institute for Clinical Excellence (NICE). (2004). Chronic obstructive pulmonary disease: national clinical guideline for management of chronic obstructive pulmonary disease in adults in primary and secondary care. *Thorax*, 59, 1-232.

National Institute for Clinical Excellence (NICE). (2010). Chronic obstructive pulmonary disease: Management of chronic obstructive pulmonary disease in adults in primary and secondary care (Partial Update). <http://publications.nice.org.uk/chronic-obstructive-pulmonary-disease-cg101>. Accessed March 12, 2013.

Ng, T.P., Niti, M., Tan, W.C., Cao, Z., Ong, K.C., Eng, P. (2007). Depressive symptoms and chronic obstructive pulmonary disease: effect on mortality, hospital readmission, symptom burden, functional status, and quality of life . *Archives of Internal Medicine*, 167(1), 60 – 67.

NHS Quality Improvement Scotland (NHS QIS) (2010). Chronic Obstructive Pulmonary Disease Services Clinical Standards. http://www.healthcareimprovementscotland.org/our_work/long_term_conditions/copd_implementation/copd_clinical_standards.aspx. Accessed March 12, 2013.

Price, I.C., Lowe, D., Hosker, H.S., Anstey, K., Pearson, M.G. & Roberts, C.M. (2006) UK National COPD Audit 2003; Impact of hospital resources and organisation of care on patient outcome following admission for acute COPD exacerbation. British Thoracic Society and the Royal College of Physicians Clinical Effectiveness Evaluation Unit, *Thorax*, 61, 837-842.

Punekar, Y.S., Rodriguez-Roisin, R., Sculpher, M., Jones, P. & Spencer, M. (2007). Implications of chronic obstructive pulmonary disease (COPD) on patients' health status: a western view. *Respiratory Medicine*, 101(3), 661–9.

Roberts, N., Ghiassi, R. & Partridge, M. (2008). Health Literacy in COPD. *International Journal of COPD*, 3(4) 499–507.

Schlomer, G., Bauman, S. & Card, N. (2010). Best Practices for Missing Data Management in Counseling Psychology, *Journal of Counseling Psychology*, 57, (1), 1–10.

Schütz, R., Rees, C., Preece, M. & Schütze, M. (2010). Low Mindfulness Predicts Pain Catastrophising in a Fear-Avoidance Model of Chronic Pain, *Pain*, 148, 120–127.

Scottish Executive (2003). NHS Code of Practice on Protecting Patient Confidentiality.

http://elearning.scot.nhs.uk:8080/intralibrary/open_virtual_file_path/i123n1168626t/6074NHSCode.pdf. Accessed 12th February 2013.

Scottish Intercollegiate Guidelines Network (SIGN). *SIGN 50 Guideline Developer's Handbook 2008*. <http://www.sign.ac.uk/guidelines/fulltext/50/section1.html>

Seamark, D.A., Seamark, C.J., Halpin, D. (2007). Palliative care in chronic obstructive pulmonary disease: a review for clinicians. *Journal of the Royal Society of Medicine*, 100, 225–33.

Smoller, J. & Otto, M. (1998). Panic, dyspnea and asthma. *Current Opinion Pulmonary Medicine*, 4, 40–45.

Soler, J.J., Sánchez, L., Román, P., Martínez, M.A. & Perpiñá, M. (2004). Risk factors of emergency care and admissions in COPD patients with high consumption of health resources. *Respiratory Medicine*, 98 (4), 318–329.

Spielberger, C.D., Gorsuch, R.L., Lushene, R., Vagg, P R., & Jacobs, G.A. (1983). *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.

Sullivan, P.F., Neale, M.C. & Kendler, K.S. (2000). Genetic epidemiology of major depression: Review and meta-analysis. *American Journal of Psychiatry*, 157, 1552–1562.

- Sundha, J., Jansonb, C., Lisspers, K., Ställberg, B. & Montgomery, S. (2012). The Dyspnoea, Obstruction, Smoking, Exacerbation (DOSE) index is predictive of mortality in COPD. *Primary Care Respiratory Journal*, 21(3), 295-301.
- Sutton, K., Cooper, M., Pimm, J. & Wallace, L. (1999). Anxiety in chronic obstructive pulmonary disease: the role of catastrophic thoughts. *Cognitive Therapy and Research*, 23(6), 573-585.
- Taylor, J., Dawson, S., Sridhar, M. (2005). Functional illiteracy amongst those with chronic obstructive pulmonary disease (COPD). *European Respiratory Journal*, 26:57s.
- Van Elm, E., Altman, G., Egger, M., Pocock, S. J., Gøtzsche, P. C. & Vandenbroucke, J. P. (2008). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Journal of Clinical Epidemiology*, 61, 344-349.
- Vogele, C., & von Leupoldt, A. (2008). Mental disorders in chronic obstructive pulmonary disease (COPD). *Respiratory Medicine*, 102(5), 764-773.
- Von Leupoldt, A., Sommer, T., Kegat, S., Baumann, H.J., Klose, H., Dahme, B. & Buchel, C. (2009). Dyspnea and pain share emotion-related brain network. *Neuroimage*, 48(1), 200-206.
- Wedzicha, J.A. & Hurst, J.R. (2007). Chronic obstructive pulmonary disease exacerbation and risk of pulmonary embolism. *Thorax*, 62(2), 103-104.
- White, P., White, S., Edmonds, P., Gysels, M., et al. (2011). Palliative care or end-of-life care in advanced chronic obstructive pulmonary disease: a prospective community survey. *British Journal of General Practice*, 61, 362-70.
- Willgoss, T.G. & Yohannes, A.M. (2013). Anxiety disorders in patients with COPD: a systematic review. *Respiratory Care*, 58(5), 858-866.
- Wolf, M.S., Gazmararian, J.A., Baker, D.W. (2005). Health Literacy and Functional Health Status Among Older Adults. *Arch Intern Med*, 165, 1946-52.

Xu, W., Collet, J.P., Shapiro, S., Lin, Y., Yang, T., Platt, R.W..... Bourbeau, J. (2008). Independent effect of depression and anxiety on chronic obstructive pulmonary disease exacerbations and hospitalizations. *American Journal of Respiratory and Critical Care Medicine*, 178 (9), 913 – 920.

Yohannes, A.M., Baldwin, R.C. & Connolly, M.J. (2000). Depression and anxiety in elderly outpatients with chronic obstructive pulmonary disease: prevalence, and validation of the BASDEC screening questionnaire. *International Journal of Geriatric Psychiatry*, 15, 1090–6.

Yohannes, A.M., Willgoss, T.G., Baldwin, R.C., Connolly, M.J. (2010). Depression and anxiety in chronic heart failure and chronic obstructive pulmonary disease: prevalence, relevance, clinical implications and management principles. *International Journal of Geriatric Psychiatry*, 25(12), 1209 – 1221.

Zigmond, A. & Snaith, R. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica*, 67, 361–370.

Zvolensky, M.J., Solomon, S.E., McLeish, A.C., Cassidy, D., Bernstein, A., Bowman, C.J., & Yartz, A.R. (2006). Incremental validity of mindfulness-based attention in relation to the concurrent prediction of anxiety and depressive symptomology and perceptions of health. *Cognitive Behaviour Therapy*, 35, 148–158.

Zwerink, M., Brusse-Keizer, M., van der Valk, P.D.L.P.M., Zielhuis, G.A., Monninkhof, E.M., van der Palen, J., Frith, P.A., & Effing, T. (2014). Self management for patients with chronic obstructive pulmonary disease (Review). *Cochrane Database of Systematic Reviews*, Issue 3. Art.

Appendices

Appendix A – Author Publication Guidelines

British Journal of Health Psychology

The aim of the British Journal of Health Psychology is to provide a forum for high quality research relating to health and illness. The scope of the journal includes all areas of health psychology across the life span, ranging from experimental and clinical research on aetiology and the management of acute and chronic illness, responses to ill-health, screening and medical procedures, to research on health behaviour and psychological aspects of prevention. Research carried out at the individual, group and community levels is welcome, and submissions concerning clinical applications and interventions are particularly encouraged.

The types of paper invited are:

- papers reporting original empirical investigations, using either quantitative or qualitative methods;
- theoretical papers which may be analyses or commentaries on established theories in health psychology, or presentations of theoretical innovations;
- review papers, which should aim to provide systematic overviews, evaluations and interpretations of research in a given field of health psychology; and
- methodological papers dealing with methodological issues of particular relevance to health psychology.

1. Circulation

The circulation of the Journal is worldwide. Papers are invited and encouraged from authors throughout the world.

2. Length

Papers should normally be no more than 5000 words (excluding the abstract, reference list, tables and figures), although the Editor retains discretion to publish papers beyond this length in cases where the clear and concise expression of the scientific content requires greater length.

3. Editorial policy

The Journal receives a large volume of papers to review each year, and in order to make the process as efficient as possible for authors and editors alike, all papers are initially examined by the Editors to ascertain whether the article is suitable for full peer review. In order to qualify for full review, papers must meet the following criteria:

- the content of the paper falls within the scope of the Journal
- the methods and/or sample size are appropriate for the questions being addressed
- research with student populations is appropriately justified
- the word count is within the stated limit for the Journal (i.e. 5000 words)

4. Submission and reviewing

All manuscripts must be submitted via [Editorial Manager](#). You may like to use the [Submission Checklist](#) to help you prepare your manuscript. The Journal operates a policy of anonymous peer review. Authors must suggest three reviewers when submitting their manuscript, who may or may not be approached by the Associate Editor dealing with the paper. Before submitting, please read the [terms and conditions of submission](#) and the [declaration of competing interests](#).

5. Manuscript requirements

- Contributions must be typed in double spacing with wide margins. All sheets must be numbered.
- Manuscripts should be preceded by a title page which includes a full list of authors and their affiliations, as well as the corresponding author's contact details. A template can be downloaded from [here](#).
- Statement of Contribution: All authors are required to provide a clear summary of 'what is already known on this subject?' and 'what does this study add?'. Authors should identify existing research knowledge relating to the specific research question and give a summary of the new knowledge added by your study. Under each of these

headings, please provide 2-3 (maximum) clear outcome statements (not process statements of what the paper does); the statements for 'what does this study add?' should be presented as bullet points of no more than 100 characters each. The Statement of Contribution should be a separate file.

- Tables should be typed in double spacing, each on a separate page with a self-explanatory title. Tables should be comprehensible without reference to the text. They should be placed at the end of the manuscript with their approximate locations indicated in the text.
- Figures can be included at the end of the document or attached as separate files, carefully labelled in initial capital/lower case lettering with symbols in a form consistent with text use. Unnecessary background patterns, lines and shading should be avoided. Captions should be listed on a separate sheet. The resolution of digital images must be at least 300 dpi.
- For articles containing original scientific research, a structured abstract of up to 250 words should be included with the headings: Objectives, Design, Methods, Results, Conclusions. Review articles should use these headings: Purpose, Methods, Results, Conclusions.
- For reference citations, please use APA style. Particular care should be taken to ensure that references are accurate and complete. Give all journal titles in full and provide doi numbers where possible for journal articles. For example:

Author, A., Author, B., & Author, C. (1995). *Title of book*. City, Country: Publisher.
Author, A. (2013). Title of journal article. *Name of journal*, 1, 1-16. doi:
10.1111/bjep.12031
- SI units must be used for all measurements, rounded off to practical values if appropriate, with the imperial equivalent in parentheses.
- In normal circumstances, effect size should be incorporated.
- Authors are requested to avoid the use of sexist language.

- Authors are responsible for acquiring written permission to publish lengthy quotations, illustrations, etc. for which they do not own copyright. For guidelines on editorial style, please consult the [APA Publication Manual](#) published by the American Psychological Association.
- Manuscripts describing clinical trials are encouraged to submit in accordance with the [CONSORT statement](#) on reporting randomised controlled trials.

6. Supporting information

Supporting Information can be a useful way for an author to include important but ancillary information with the online version of an article. Examples of Supporting Information include appendices, additional tables, data sets, figures, movie files, audio clips, and other related nonessential multimedia files. Supporting Information should be cited within the article text, and a descriptive legend should be included. Please indicate clearly on submission which material is for online only publication. It is published as supplied by the author, and a proof is not made available prior to publication; for these reasons, authors should provide any Supporting Information in the desired final format.

For further information on recommended file types and requirements for submission, please visit the [Supporting Information page](#) on Author Services.

7. OnlineOpen

OnlineOpen is available to authors of primary research articles who wish to make their article available to non-subscribers on publication, or whose funding agency requires grantees to archive the final version of their article. With OnlineOpen, the author, the author's funding agency, or the author's institution pays a fee to ensure that the article is made available to non-subscribers upon publication via Wiley Online Library, as well as deposited in the funding agency's preferred archive. A full list of [terms and conditions](#) is available on Wiley Online Library.

Any authors wishing to send their paper OnlineOpen will be required to complete the [payment form](#).

Prior to acceptance there is no requirement to inform an Editorial Office that you intend to publish your paper OnlineOpen if you do not wish to. All OnlineOpen articles are treated in the same way as any other article. They go through the journal's standard peer-review process and will be accepted or rejected based on their own merit.

8. Author Services

Author Services enables authors to track their article – once it has been accepted – through the production process to publication online and in print. Authors can check the status of their articles online and choose to receive automated e-mails at key stages of production. The author will receive an e-mail with a unique link that enables them to register and have their article automatically added to the system. Please ensure that a complete e-mail address is provided when submitting the manuscript. Visit [Author Services](#) for more details on online production tracking and for a wealth of resources including FAQs and tips on article preparation, submission and more.

9. Copyright and licences

If your paper is accepted, the author identified as the formal corresponding author for the paper will receive an email prompting them to login into Author Services, where via the Wiley Author Licensing Service (WALS) they will be able to complete the licence agreement on behalf of all authors on the paper.

For authors signing the copyright transfer agreement

If the OnlineOpen option is not selected the corresponding author will be presented with the copyright transfer agreement (CTA) to sign. The terms and conditions of the CTA can be previewed in the samples associated with the [Copyright FAQs](#).

For authors choosing OnlineOpen

If the OnlineOpen option is selected the corresponding author will have a choice of the following Creative Commons Licence Open Access Agreements (OAA):

- Creative Commons Attribution Non-Commercial Licence (CC-BY-NC)
- Creative Commons Attribution Non-Commercial -NoDerivs Licence (CC-BY-NC-ND)

To preview the terms and conditions of these open access agreements please visit the [Copyright FAQs](#) and you may also like to visit the [Wiley Open Access Copyright and Licence](#) page.

If you select the OnlineOpen option and your research is funded by The Wellcome Trust and members of the Research Councils UK (RCUK) you will be given the opportunity to publish your article under a CC-BY licence supporting you in complying with Wellcome Trust and Research Councils UK requirements. For more information on this policy and the Journal's compliant self-archiving policy please visit our [Funder Policy](#) page.

10. Colour illustrations

Colour illustrations can be accepted for publication online. These would be reproduced in greyscale in the print version. If authors would like these figures to be reproduced in colour in print at their expense they should request this by completing a [Colour Work Agreement](#) form upon acceptance of the paper.

11. Pre-submission English-language editing

Authors for whom English is a second language may choose to have their manuscript professionally edited before submission to improve the English. A list of independent suppliers of editing services can be found in [Author Services](#). All services are paid for and arranged by the author, and use of one of these services does not guarantee acceptance or preference for publication.

12. The Later Stages

The corresponding author will receive an email alert containing a link to a web site. A working e-mail address must therefore be provided for the corresponding author. The proof can be downloaded as a PDF (portable document format) file from this site. Acrobat Reader will be required in order to read this file. This software can be downloaded (free of charge) from [Adobe's web site](#). This will enable the file to be opened, read on screen and annotated direct in the PDF. Corrections can also be supplied by hard copy if preferred. Further instructions will be sent with the proof. Hard copy proofs will be posted if no e-mail address is available. Excessive changes made by the author in the proofs, excluding typesetting errors, will be charged separately.

13. Early View

British Journal of Health Psychology is covered by the Early View service on Wiley Online Library. Early View articles are complete full-text articles published online in advance of their publication in a printed issue. Articles are therefore available as soon as they are ready, rather than having to wait for the next scheduled print issue. Early View articles are complete and final. They have been fully reviewed, revised and edited for publication, and the authors' final corrections have been incorporated. Because they are in final form, no changes can be made after online publication. The nature of Early View articles means that they do not yet have volume, issue or page numbers, so they cannot be cited in the traditional way. They are cited using their Digital Object Identifier (DOI) with no volume and issue or pagination information. Eg Jones, A.B. (2010). Human rights Issues. *Journal of Human Rights*. Advance online publication. doi:10.1111/j.1467-9299.2010.00300.x

Further information about the process of peer review and production can be found in this document. [What happens to my paper?](#)

Appendix B: Excluded Papers

| Studies excluded (N) | Reason(s) for exclusion |
|-----------------------------|--------------------------------------------------------------|
| Abstract Review | |
| 5 studies excluded | Qualitative Research |
| 22 studies excluded | Anxiety not measured |
| 46 studies excluded | Hospitalisation not measured |
| 15 studies excluded | Review article, descriptive article or book chapter |
| 3 studies excluded | Conference presentation/poster |
| 2 studies excluded | Wrong population (disease/caregiver research) |
| Full article Review | |
| 1 study excluded | Qualitative Research |
| 12 studies excluded | Anxiety not measured/not differentiated from depression |
| 5 studies excluded | Hospitalisation not measured |
| 13 studies excluded | Association between anxiety and hospitalisation not measured |
| 5 studies excluded | Review article, descriptive article or book chapter |
| 2 studies excluded | Conference presentation/poster |
| 1 study excluded | Case study |
| 1 study excluded | Not available in English language |

Appendix C: Study Rating Scale

| | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Quality criteria Title: Does anxiety impact upon COPD hospital admissions? AUTHORS: Gráinne O' Brien (Supervisor – Paul Graham Morris) | | | |
| TITLE of study being reviewed: Authors of study being reviewed: | | | |
| 1. Sample (representativeness) | | | |
| 1.1: How approached? | The sampling method ensures that the sample selected is representative of the COPD population and is thus generalizable | Well covered... 2 Adequately addressed... 1 Poorly addressed... 0 Not addressed (i.e. not mentioned, or indicates that this aspect of study design was ignored)...0 Not reported (i.e. mentioned but insufficient detail to allow assessment to be made)...0 Not applicable...0 | <u>Well covered</u> = the sampling method is clearly reported and ensures that minimal bias is introduced (e.g. random sequence of those admitted to hospital). Appropriate inclusion/exclusion criteria are applied. <u>Adequately addressed</u> = the sampling method may introduce an element of bias. Inclusion/Exclusion criteria inappropriate. <u>Poorly addressed</u> = Inclusion/Exclusion criteria not reported. |
| 1.2: Who are they? | The baseline demographic and clinical characteristics of participants are clearly stated and representative of COPD population | Well covered... 2 Adequately addressed ... 1 Poorly addressed... 0 Not reported...0 | <u>Well covered</u> = Relevant demographic and clinical characteristics are described (Severity of COPD, age, gender) and are representative of population <u>Adequately addressed</u> = At least two relevant patient characteristics are described (Severity of COPD, age, gender) and are representative of population <u>Poorly addressed</u> = One or no relevant patient characteristics are described (Severity of COPD, age, gender) or are not representative of population |
| 1.3: Who took part? | The study clearly indicates number of participants invited to take part in research and states attrition/questionnaire | Well covered... 2 Adequately addressed ... 1 Poorly addressed... 0 Not addressed...0 Not reported...0 | <u>Well covered</u> = details given regarding numbers of people invited participate in study, opt in rate and drop out rate <u>Adequately addressed</u> = details given on at least two of the |

| | | | |
|-----------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | return rates | | following: number of people invited to participate in study, opt in rate, drop out rate <u>Poorly addressed</u> = insufficient detail given i.e. detail given on less than two of the following: number of people invited to participate in study, opt in rate, drop out rate |
| /6 | | | |
| 2. Power & Sample Size | | | |
| 2.1 | Sample size was sufficient for analysis relating to anxiety & hospitalisation | Well covered... 2 Adequately addressed ... 1 Poorly addressed... 0 Not addressed...0 Not reported...0 | <u>Well covered</u> = Number of participants was sufficient to enable power of at least .8, where effect size was medium and alpha was set at .05 <u>Adequately addressed</u> = Number of participants was sufficient to enable power of at least .7, where effect size was medium and alpha was set at .05 <u>Poorly addressed</u> = Number of participants was sufficient to enable power of less than .7, where effect size was medium and alpha was set at .05 |
| /2 | | | |
| 3. Outcome measures | | | |
| 3.1 | Anxiety is measured in a standard, valid, reliable way | Well covered... 2 Adequately addressed... 1 Poorly addressed... 0 Not reported...0 | <u>Well covered</u> = Anxiety measure is a diagnostic measure <u>Adequately addressed</u> = Anxiety measure is a screening measure and has acceptable validity/psychometrics and valid for those with COPD <u>Poorly addressed</u> = Anxiety measures do not have acceptable validity/ psychometrics and have not been validated with those with COPD |
| 3.2 | Clearly reported robust method of measuring hospital admissions | Well covered... 2 Adequately addressed ... 1 Poorly addressed... 0 Not reported...0 | <u>Well covered</u> = Measured through a Hospital or Community Database or A&E records <u>Adequately addressed</u> = Measured through patient self-report <u>Poorly addressed</u> = Unclear how measured. |
| /4 | | | |
| 4. Statistical Analysis | | | |

| | | | |
|-----|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4.1 | Data analysis is appropriate to the study design and the type of outcome measure. | Well covered... 2 Poorly addressed... 0 Not reported...0 | <u>Well covered</u> = analysis appropriate to design. <u>Poorly addressed</u> =Inappropriate analysis used. Poor method used to deal with missing data |
| 4.2 | Confounding variables (e.g. severity of COPD, depression) are adequately considered and addressed in study. | Well covered... 2 Adequately addressed ... 1 Poorly addressed... 0 Not reported...0 | <u>Well covered</u> = Potential confounding variables are adequately recognised and considered in the statistical analysis <u>Adequately addressed</u> = Potential confounding variables are recognised but are not considered in the statistical analysis <u>Poorly addressed</u> = Potential confounding variables are not recognised or considered in the statistical analysis |
| | | | /4 |
| | | | Total: /16 |

Appendix D - GOLD Spirometry Criteria for COPD Severity

| | | |
|----------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| I. Mild COPD | * FEV1/FVC < 0.7 * FEV1 > or = 80% predicted | At this stage, the patient is probably unaware that lung function is starting to decline |
| II. Moderate COPD | * FEV1/FVC < 0.7 * FEV1 50% to 79% predicted | Symptoms during this stage progress, with shortness of breath developing upon exertion. |
| III. Severe COPD | * FEV1/FVC < 0.7 * FEV1 30% to 49% predicted | Shortness of breath becomes worse at this stage and COPD exacerbations are common. |
| IV. Very Severe COPD | * FEV1/FVC < 0.7 * FEV1 < 30% predicted or FEV1 < 50% predicted with chronic respiratory failure | Quality of life at this stage is gravely impaired. COPD exacerbations can be life threatening. |

Appendix E -Information Sheet

Do psychological factors impact on anxiety and COPD related hospital admissions?

We would like to invite you to take part in a research study about living with COPD. Before you decide if you would like to take part, you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully.

Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part in the research.

What is the purpose of the study?

We know that living with COPD can be very challenging for people. The symptoms can affect what you can and cannot do, and we know it can affect how people feel. This research study asks you questions about how COPD affects activities, moods and feelings as well as your thoughts about living with COPD. We hope that the results from this study will help us to understand more about the challenges of living with COPD. This will help us to think about possible supports that health professionals may be able to put in place to help people with COPD.

Why have I been invited?

People who have COPD and who have had at least one COPD-related hospital admission in the past three years have been invited to take part in this research study.

What will I have to do?

If you are interested in taking part in this research, please read the rest of this information sheet and then complete the attached consent form and questionnaire booklet. It contains questions about yourself and your experience of living with the symptoms of COPD. This may take up to 30 minutes to complete. Please use the attached stamped addressed envelope to return it to the researcher. We would be grateful if you could return this questionnaire within two weeks.

As the study involves recording medical information about your COPD and previous hospital admissions, we would like to seek your permission to access your medical records. If you are happy for us to do this, there is a box for you to tick on the consent form. All the information collected will be kept in the strictest of confidence by the study investigators.

Completing the questionnaire pack may highlight if you are experiencing any difficult emotions presently e.g. being afraid or feeling down about your COPD. We encourage you to contact your GP to discuss this as there may be services that may be helpful for you. Alternatively, a helpful free website is

<http://www.lltff.com>. This website 'living Life to the Full' is a free online life skills course with advice about anxiety and low mood.

Do I have to take part?

It is up to you to decide whether or not to take part. If you decide not to take part in this research, it will not affect any care or treatment you receive. If you decide to take part you are still free to withdraw at any time and without giving a reason.

What are the possible disadvantages and risks of taking part?

It will take a little time to complete the questionnaire pack. Do not feel like you have to do this in one sitting, you can take your time and if it is easier you can complete the booklet over a number of shorter sittings (e.g. chunk it in to 5-10 minute slots spread over the day). If you would like some support to complete this questionnaire, please ring the number 0131 537 9139 or email grainne.o'brien@nhslothian.scot.nhs.uk and we can complete it over the telephone once your consent form has been returned.

What are the possible benefits of taking part?

We hope that the results from this study will help us to understand more about the challenges for people of living with COPD. The research will further help us to understand if there are certain important factors when living with COPD that can lead to emotional distress or increased hospital admissions for people. The project may highlight possible suggestions of supports or psychological therapies that may be useful for people with COPD.

Will my taking part in the study be kept confidential?

We will write up the results from the study and share this information with staff working with people with COPD. This will probably be in a specialist medical journal. All identifiable information will be removed prior to the write-up stage of the research process and your personal information will not appear in any report.

If you agree to take part in this study, your GP will be informed of your participation and of any outcomes.

According to Scottish regulations related to research, it is recommended that data be available to Sponsor(s) from regulatory authorities or NHS Lothian so they can monitor research standards. In the consent form, we seek your permission for this. Furthermore, we seek your permission to store your anonymised data so that it may be used in future research projects if of public interest.

What happens when the research stops?

At the end of the research you will receive information about the results of the research project, if you would like to.

I have more questions.....

If you have any questions about the project please contact:

Gráinne O' Brien
Chief Investigator
Department of Clinical Psychology, Astley Ainslie Hospital, Edinburgh
Tel: 0131 537 9139
Email: grainne.o'brien@nhslothian.scot.nhs.uk

Alternatively, you can contact somebody independent of the research team
Dr Evelyn Janetta
Clinical Psychologist
Department of Clinical Psychology, Astley Ainslie Hospital, Edinburgh
Tel: 0131 537 9128

If you wish to make a complaint about the study please contact NHS Lothian:

NHS Lothian Complaints Team
2nd Floor
Waverley Gate
2-4 Waterloo Place
Edinburgh
EH1 3EG
Tel: 0131 465 5708"

Appendix F: Consent Form

CONSENT FORM

Patient Identification Number :

Chief Investigator: Gráinne O' Brien

Project: Do psychological factors impact on anxiety and COPD related hospital admissions?

Please read the below statements and put your initials in the box if you are in agreement

Please put your
initials in the box

1. I confirm that I have read and understand the information sheet dated 17/4/13 (V4) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐
3. I understand that relevant sections of my medical notes and data collected during the study may be looked at by individuals from the Research team, Sponsor(s), from regulatory authorities or from the NHS Board where it is relevant to my taking part in this research. I give permission for those individuals to have access to my records ☐
4. I give permission for my anonymised data to be used in future research projects ☐
if of public interest.
5. I understand that my GP will be notified that I am taking part in this research and will be updated on any outcomes. ☐
6. I would like to receive feedback from this research study. ☐

Signature (Participant) Date

Name (Participant)

Signature
(Person taking consent)
consent) Date

Name
(Person taking